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THE IRISH NATURALIST

A Monthly Journal

OF

GENERAL IRISH NATURAL HISTORY

ORGAN OF THE

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EDITED BY

GEORGE H. CARPENTER, M.Sc., M.R.I.A.,

R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.

AND

ROBERT J. WELCH, M.R.I.A.

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VOLUME XXIII.

HELOSCIADIUM MOOREI.

BY THE REV. H. J. RIDDELSDELL.

In the course of the enquiry preliminary to the writing of this paper, I have owed much to Messrs. R. Lloyd Praeger, Hugo Glück, E. G. Baker, G. C. Druce, and others for help, advice, and information ; most of all I am grateful for the generous loan of herbarium collections or important sheets of specimens, amongst others, from the authorities at the Herbarium, Kew Gardens ; from the University of Cambridge, in whose possession is Babington's collection ; from the National Museum at Dublin, which has a good collection of specimens of *Helosciadium*¹ *Moorci*, many of them collected by Mr. Praeger. Mr. Praeger also has put at my service his own fine series of the form, some fifteen sheets, gathered in various parts of Ireland. Mr. F. J. Hanbury's herbarium, containing Boswell-Syme's type specimen ; Mr. Druce's ; Mr. Bailey's large and useful collection ; these and many others have contributed material for the paper. To all the gentlemen mentioned and to various correspondents who have given information, or even sent living specimens, my grateful thanks are due. Without their co-operation nothing could have been done.

¹ The generic name, *Helosciadium*, is used here, for the sake of conformity with an article written by Mr. E. G. Baker and myself, and printed in the *Journal of Botany*, June, 1906, on forms of *Helosciadium nodiflorum*. But probably it is better to include this genus in *Apium*, and indeed I should do so if writing more widely.

The history of our knowledge of the plant is as follows :—

Sowerby (*English Botany*, Ed. III., Vol. 4, pp. 102-3 (1865)), under *Helosciadium inundatum*, Koch, says : “ Dr. D. Moore finds in the River Boyne, Co. Cavan, a very luxuriant form, which is nearly as large as *H. nodiflorum*, and has the lower leaves with the segments of the leaflets mostly linear or strapshaped, not setaceous ; the involucrel of five or six leaves.”

The Supplement of 1891, forming Vol. XIII. of Sowerby's *English Botany*, p. 187, under *Apium inundatum*, Reichb. f., makes a new variety, viz. : “ var. *Moorei*, Syme=*A. inundatum*, Reichb. f., var. *Moorei*, Syme, ex Hanbury in *London Catalogue of British Plants*, ed. 8, p. 16 (1886) ; *Helosciadium inundatum*, Koch, var. *Moorei*, Boswell (Syme), in *Botanical Exchange Club Report for 1876*, p. 20 ; 1881, p. 51 ; and 1886, p. 153. A large, luxuriant form, nearly as large as *H. nodiflorum*, with the segments of the leaflets of the lower leaves linear or strap-shaped, not setaceous. Involucrel of five or six bracts. Rare. River Boyne, Cavan, and Downpatrick, Down, Ireland. . . . I have not seen a specimen of var. *Moorei*, and have, therefore, repeated the description given of it in Vol. IV., where it is mentioned without a name. Specimens distributed by Mr. S. A. Stewart from Quoile River, Downpatrick, Ireland, were considered by Professor Babington to be var. *Moorei*, but Mr. Boswell states that they are ‘ not at all like my *H. inundatum*, var. *Moorei*,’ see *Exchange Club Report for 1881*, p. 51.”

Specimens from Dr. Moore are (1) in Herb. Boswell-Syme (in the possession of Mr. F. J. Hanbury), labelled “ *Helosciadium inundatum*, var., *Sium inundatum*, var., River Boyne, Co. Cavan, Dr. D. Moore ” ; and (2) in Herb. C. C. Babington (in the possession of the University of Cambridge), labelled “ *Helosciadium inundatum*. In the River Boyne, Co. Cavan. D. Moore,” with “ *H. Moorei*, Syme,” added ; and (3) in the National Herbarium at Dublin. These are nearly the stoutest specimens of the form which I have seen ; the first is that from which Syme named his variety. But (apparently) earlier than these is a

specimen of Dr. Moore's in Herb. Babington, from Lough Erne, 1857; at first called *Helosciadium repens*? and afterwards recognised as Syme's var. *Moorei*. This Lough Erne specimen is peculiar in having capillary segments to the lowest leaves. There is a yet earlier specimen at Kew, gathered at Ennis in 1804, by J. T. M[ackay], and forming part of Hooker's Herbarium.

The Report of the Botanical Exchange Club for 1876, p. 20, gives (on a specimen of *H. inundatum* sent from Cheshire as "*Moorei*?") J. T. Boswell's descriptive remark: "The var. *Moorei* has the leaf segments very much larger, resembling those of small *H. nodiflorum* or of *H. repens*."

In the Botanical Exchange Club Report, 1881, p. 51, we find:—

"*Helosciadium* '*Moorei*'?—Among grass by the side of a little rill flowing into the Quoile river, Downpatrick, Ireland, June, 1880, S. A. STEWART. The *Moorei* which I place under *inundatum*, C. C. BABINGTON. This is not at all like my *H. inundatum* var. *Moorei*. It is a luxuriant state of *ochreatum*, approaching the normal form of *H. nodiflorum*, J. T. BOSWELL."

The Report for 1886, p. 153, says:—

"*Helosciadium inundatum*, Reichb., var. *Moorei*, Syme. Stagnant marsh, Downpatrick, Ireland, 16th September, 1886, S. A. STEWART. This may be *H. Moorei*, which is a plant I do not well understand. It is not that of the Exchange Club, 1876, but much like other Irish specimens of *Moorei*, C. C. BABINGTON."

In the Report for 1897, p. 548, occurs:—

"*Apium inundatum*, Reichb. fil. By Renishaw Canal, Derby, 13th August, 1897. A dry land form, which occurred in one or two spots above the water level, W. R. LINTON.—I am rather doubtful about this. Is it not *A. nodiflorum*, var. *repens*, E. G. BAKER? In all the mud forms of *A. inundatum* which I have seen there are leaflets showing transitions from the finely cut to the subentire; these specimens do not show them. From the larger style and other characters I am inclined to refer this plant to a form of *A. nodiflorum*, but riper fruits are needed. In facies it

is very like (although smaller) *A. inundatum*, var. *Moorei*. Herr Freyn considers it to be *A. inundatum*, G. C. DRUCE."

W. R. Linton, in his *Flora of Derbyshire*, p. 159, says, under *Apium inundatum*: "A form occurs near Renishaw, on the edge of the canal, with many aerial leaves and no submerged ones;" but Mr. Druce "collected it with wholly submerged leaves in October" [1911]; see B. E. C. Rep., 1911, p. 96.

In B. E. C. Report, 1911, p. 20-21. Mr. Druce raised the form to the status of a species, as "*Apium Moorei* (Syme) mihi," quoting it from Derbyshire and Lincoln N. He refers at the end of the paragraph to the foliage, the larger style (than in *H. inundatum*), and 5-6 bracteated involucl as distinctive; and I agree with him that these (and other) features collectively may be enough to mark off a good species. But I venture to dissent from his opinion, given earlier in the same paragraph, to the effect that: "This has good claims to be considered a species from the character of its leaves, both in the aquatic and terrestrial states;" for leaf-character is, in my opinion, quite insufficient of itself, in any case that I can recall, to constitute a specific differentiation. Moreover, the leaf segments of *Moorei* in its most characteristic form are very largely a broadened and lengthened edition of those of *inundatum*.

In the same report, p. 96, Mr. Druce refers to specimens actually distributed by him. He confirms his idea of 1897, that the Renishaw plant is identical with the Irish *Moorei*, and adds: "Dr. Hugo Glück this year [1911] had been gathering the Irish plant, so I took him to see the Renishaw form, the specimens distributed [now] being the aquatic form, which grew there rather sparingly. I believe it to be a distinct species from either *nodiflorum* or *inundatum*." The specimens bore no inflorescence.

At this point I suggested to Mr. Druce the possibility of Syme's var. *Moorei* being a hybrid between the two common species, *A. inundatum* and *A. nodiflorum*. He replied by saying that this obvious suggestion was considered and rejected by him and Dr. Glück, when at Renishaw, on the ground that they saw "no intermediates," i.e., as I understood, no forms going off from *Moorei* towards *nodiflorum* or *inundatum*.

In the *Irish Naturalist*, of 1912, p. 235, Mr. Druce gave publicity to the fact that he and Herr Glück had considered the question of hybridity. It is, however, part of my purpose in this paper to advance good reasons for supporting the theory of hybridity. In doing so, I am aware that the theory cannot be proved. Most likely it cannot be disproved either; for even if actual experiment should succeed in producing a cross between the two species *Helosciadium inundatum* and *nodiflorum* which should be quite different from *Moorei*, that is very doubtfully conclusive as to what may happen under the freely working and unartificial conditions of nature. Of course, if artificial cross-breeding produced *Moorei*, it would add very strongly to the probability of the latter being, in its natural habitats, also a true hybrid in origin. But beyond probability it is (I believe) impossible to go in this case. There are, however, as will be shown, strong reasons for the probable conclusion that *A. Moorei* is a hybrid between *A. inundatum* and *A. nodiflorum*. To this effect I wrote to Dr. Glück in October, 1912, and when he saw my reasons he was quite ready to agree with me.

The plant may be described as follows :—

Root perennial, consisting of long white fibres. Stem often rooting freely from its lower joints, and even to within two or three joints of the extremity. The autumn form of the plant is, as in *H. nodiflorum*, a tuft of leaves.

Plant light green, glabrous; very variable in size (6 to 30 inches).

Stem generally weak, usually erect in the water, or smaller, more decumbent, and rather stronger. Much branched from near the base of the stem with long erectish axillary branches; surface of stem lightly furrowed.

Leaves pinnate and very varied.

Upper leaves with 7-9 leaflets; leaflets broadly ovate or obovate to narrowly lanceolate or oblanceolate, or narrowly elliptic. Leaflets variously cut; sometimes with a few broad, blunt teeth, one or two of which may actually form lobes (especially in the case of the broader leaflets); narrower leaflets cut into narrower and acuter teeth, and sometimes into narrow, acute lobes, sometimes even into three subequal lobes.

Lowest leaves, if fine cut, usually larger (in general outline) than the upper leaves. Leaflets up to eleven in number, and usually cut into long, acute, linear segments, very rarely into capillary segments.

Middle leaves usually show a gradual progress from the form of the upper leaflets to that of the lowest leaflets, though this progress is not always regular.

Ocreae of leaflets sometimes well marked and abrupt; sometimes slighter, and formed by gradual expansion from the petiole.

Petiole long; longer or shorter than 'blade' of leaf, but always well marked.

Sometimes the leaflets are all similar throughout the plant, but frequently there is a good gradation from the broad form at top to the pinnatifid or pinnate form of leaflet on the lowest leaves. Leaflets on a branch are usually finer cut than those of the leaf from the axil of which the branch springs, but not always.

The plant is singularly sparse in flowers; as compared with the supposed parents, the umbels are few to a stem.

Umbels opposite leaves; long-stalked; pedicel nearly always longer than rays, generally much longer.

Involucral bracts rare, minute. I have never seen more than one on an umbel.

Umbel rays almost always 2-3, rarely 1, rarely 4.

Umbellules many-flowered (up to 12).

Petals broadly ovate, with a broadish point, very small, white.

Bracts of umbellule many (up to 6), very unequal.

Styles (of flower and undeveloped fruit), rather variable, even on one plant; always intermediate in length between those of the 'parents,' but, as far as *proportion* goes, not varying very much more than that of *inundatum*. See, however, note below on the Llandderfel plant in Herb. Druce.

Ripe fruit, not seen on any plant. One specimen (Maghery, Co. Armagh, in Herb. Praeger) shows one fruit beginning to form on one umbel, but it had not developed when gathered, and no details are possible. It looks nearer to

inundatum than *nodiflorum*. This failure to develop is not due to the plant being a late flowerer; many of the Irish specimens were gathered in July; flowers are showing, even in June. Whether the specimen is early or late gathered, the failure to develop fruit is constant.

Habitat.—The Irish plant grows in ditches or along the margins of slow streams, generally floating and forming a tangled mass of stems, the upper portions of which are aerial, rising several inches (6 or 9, if supported by other vegetation) above the surface. It becomes terrestrial only during periods of exceptionally low water.

The plant propagates itself vegetatively.—Broken off pieces of leaf take root and form separate plants. This is, no doubt, the reason why in any given area the form found there is homogeneous.

The range of variation is thus, in some respects, particularly those which concern vegetative characters, very great. Taking two well-contrasted forms, say, that from Tuam, N.E. Galway (which by the kindness of Mr. Praeger; I have now growing in my garden), and that from Portumna, S.E. Galway (to be seen in many herbaria from gatherings made by E. F. and W. R. Linton in 1885), we might illuminate the subject by naming them respectively *f. subinundatum* and *f. subnodiflorum*. The former is, indeed, much larger than most *inundatum*, and the latter smaller than most *nodiflorum*. But the foliage of the former is clearly near that of *inundatum*; it is broader and longer in all its parts and as a whole; capillary segments become linear, lobes are larger and broader, and even tend to merge into each other; but it is of essentially the same character. The texture of this form is more that of a 'water-plant'; whereas in *f. subnodiflorum* the texture reminds one of small dry-land (or mud) forms of *nodiflorum*. This latter form of *Moorei* has the leaflets far less cut: in the upper leaves they are very near *nodiflorum* in character, but in the lower leaves are strongly toothed or lobed. The floral characters separate it from *nodiflorum*.

The Haxey gathering (G. Webster, 1881 and 1884) deserves special notice. It differs from all others in one important respect, its variability, to wit. Most localities

produce only one form, and that with very slight variations. At Haxey the plants are all on the small side, but they vary considerably in leaf cutting and in length of style; some are extremely near *inundatum*, but are (as appears from style-character and lowest leaves without capillary segments) really *Moorci*. This means probably (if the hybrid explanation is right) that in most localities the stock has originated from one crossing, which has been propagated vegetatively only; but at Haxey there have either been several original hybrid-plants, all of which have been reproduced vegetatively, or else the plant produces fruit; or it may be that the 'hybrid' has crossed with one of the 'parents,' perhaps more than once.

The above description has already indicated some of my reasons for considering it more probable that the plant is a hybrid than otherwise. They may be summed up as:—

1. Great range of variation in habit and facies. This is remarkably impressed on the mind if a line is taken from the ordinary luxuriant Irish forms (*e.g.*, those from R. Boyne, Kilrea, L. Erne, Tuam, Downpatrick, etc.) through those from Derrymore, Castleconnell, and Renishaw to the curious little form (apparently characteristic of the Shannon area) from Portumna and Woodford.

2. Great variability in foliage, which may be traced in the same series of plants. In specimens from Portumna all the foliage is of approximately one character, and near that of *nodiflorum*, though even here the lower leaves are more divided than the upper. In one specimen from Lough Erne (Herb. Babington) the segments of the lower leaves are capillary.

3. Sterility, almost absolute or absolute. (This has persisted in one year's cultivation, *vide* Glück). The fruit (with the exception above noted), always after the fall of the petals, proceeds to wither and eventually to drop off before any signs of ripening or development take place. (But it must not be forgotten that vegetative reproduction would encourage sterility, as in *Lysimachia Nummularia* and *Cardamine pratensis*).

4. Considerable vegetative development; as compared with slight floral development. There is hardly any ex-

ception to this feature (which is in marked contrast with the character of the 'parents'), except, perhaps, in some of the smaller forms.

5. Intermediate position, in many respects, between the 'parents,' with occasional decided approach in part or whole towards one or the other end of the chain. In some points it is, of course, not intermediate at all, *e.g.*, it has made for itself a specialised method of propagation, which entirely compensates for the disadvantage of sterility.

6. I know of no case of its occurrence, except where both parents exist, either in the near distance, or immediate vicinity. But I have not been able to work out this point at all fully.

In giving an account of the distribution of *Helosciadium* x *Moorei*, as I believe we ought to call it, it is interesting to note that there seems to be no record of its occurrence except in Ireland and England (and ? Wales). Dr. Glück, in spite of his unrivalled knowledge of aquatic plants, found it a novelty on his visit to these islands in 1911. The following account is very largely the work of Mr. Praeger.

IRELAND.

- | | | |
|---|----|--|
| 8. Limerick .. | .. | Castleconnell, on R. Shannon, coll. R. Ll. Praeger. |
| 9. Clare .. | .. | Ennis, by the R. Fergus, 1804, J. T. Mackay. Glanquin, 1905, R. Ll. P. |
| 15. Galway S.E. | .. | Portumna and Woodford, 1885, E. F. & W. R. Linton. |
| 17. Galway N.E. | .. | Tuam, on R. Clare, 1899, R. Ll. P. |
| 21. Dublin .. | .. | Royal Canal, Lucan, 1894, R. Ll. P. |
| 22. Meath .. | .. | R. Boyne, D. Moore. |
| (This record should read so. Mr. Praeger tells me that "no part of the Boyne lies in Cavan.") | | |
| | | Navan, 1900, R. Ll. P. |
| 33. Fermanagh | .. | L. Erne, 1857, D. Moore. |
| 34. S. Donegal | .. | N.W. of Ballyshannon, Hart's <i>Flora of Donegal</i> |
| 37. Armagh .. | .. | Maghery, on R. Blackwater, 1892, R. Ll. P. Marsh near Morrow's Point, L. Neagh (R. Ll. P.), <i>Cyb. Hib.</i> |
| | | Mouth of R. Closet, (R. Ll. P.), <i>Cyb. Hib.</i> |
| 38. Down .. | .. | R. Quoile, and Saul, Downpatrick, 1880 and 1886, S. A. Stewart; and 1887 and 1890, R. Ll. P. |

39. Antrim Derrymore, 1886, R. Ll. P.
 Gawley's Gate, L. Neagh, 1886, R. Ll. P.
 Lagan Canal, L. Neagh, 1892, R. Ll. P.
 Portmore, D. Moore.
 Selshan (S. A. Stewart), *Flor. N.E. Ireland*.
 40. Derry Kilrea, on R. Bann, 1894, R. Ll. P.

It is most frequent in Ulster, though occurring in all four provinces. It is unrecorded from the extreme west, and from the whole of the south-east.

ENGLAND.

In England it is much rarer. The only certain records I can find are :—

- 32 NORTHAMPTON }
 Co., and } Peakirk (on R. Welland), 1913, G. C. Druce.
 53 S. LINCOLN ..
 54 N. LINCOLN .. Haxey, 1881 and 1884, G. Webster; also
 Walkerith and Torksey, *vide* Woodruffe-
 Peacock.
 57 DERBYSHIRE .. Renishaw, 1897, W. R. Linton.

Specimens in the Cambridge University Herbarium, labelled "near Gainsborough, Yorkshire, coll. G. Webster," and in Mr. Hanbury's Herbarium, labelled "near Brigg, Lincolnshire, G. Webster," both August, 1884, are puzzling. Mr. Webster himself collected the plant at Haxey in August, 1884, and denies having collected it in the other localities. (The labels were not written by him.) He can only suppose that a mistake of locality was made by correspondents.

As regards Wales, there are specimens in Herb. Druce from Llandderfel (near Llangollen), 1882 (coll. W. Pamplin), which Dr. Glück named *Moorei*. They are four scrappy pieces which certainly in foliage suggest *Moorei* strongly; but the evidence is inconclusive. The lower leaves are lacking; the specimens are only parts of plants. The umbels are more frequently two-rayed than three-rayed: in *inundatum* three-rayed umbels are frequent; and I have seen undoubted *inundatum* (e.g., from Britanny, in Herb. Ley) which was nearly as luxuriant in foliage as these specimens from Barmouth. The most serious objection

against their identification as *Moorei* is found in the styles, which are certainly those of *inundatum*. The record must remain doubtful; on the whole I rather incline at present to put the gathering to *inundatum*, but hope the plant may be found again.

SCOTLAND.

In Herb. Boswell-Syme there is a specimen from Loch of Drum, Kincardine, 1850, three to eight inches high, which belongs to the *inundatum-Moorei* series of plants. The segments of leaflets are not quite capillary; fruit pedicel is longer than usual in *inundatum*, and so is the style. I am not confident, but on the whole think that it is *inundatum* and not *Moorei*.

In Herb. C. Bailey is a plant from Castle Donington, on the Trent, coll. July, 1885, with the segments of the submerged leaves not capillary; and I have seen the same thing in a specimen from near Bristol. These and the like must be kept under *H. inundatum*.

CLAVIS OF HELOSCIADIUM SPECIES.

<i>H. nodiflorum</i> .	<i>H. repens</i> .	<i>H. Moorei</i> .	<i>H. inundatum</i> .
<i>Stem</i> rooting; branches sometimes root freely, sometimes not.	Stem and branches root at every joint.	Stem tends to root at lower nodes.	On mud roots freely. (Generally found in water).
<i>Leaflets</i> , 3 to 7 or 9; serrate; varying in breadth, but not at all lobed as a rule.	9 to 11; often sub-orbicular, strongly toothed, often lobed.	Varying greatly; upper leaves less cut, lowest cut into linear segments.	Upper leaves cut in wedgeshaped lobes, lower in capillary segments.
<i>Umbels</i> , many; usually very shortly stalked, but not infrequently with long pedicels.	Many; very long pedicels	Few; long-pedicelled.	Many; long-pedicelled.
<i>Involucral bracts</i> , 0 or 1 or 2.	Many.	Rare and minute.	0.
<i>Umbel rays</i> , many.	Normally 5 or 6.	2-3.	2(-3).
<i>Styles</i> , long, reflexed in fr.	Long, reflexed in fr.	Intermediate in length.	Very short, stigma often nearly sessile.
<i>Fruit</i> , longer than broad; nearly black, with lighter-coloured ridges.	Smaller, broader than long; lighter brown with ridges less marked.	0.	Oblong; tapering below; ridges strongly marked.

BIRD MIGRATION IN RATHLIN ISLAND.

BY MARY G. S. BEST, F.Z.S., AND MAUD D. HAVILAND.

During part of September and October, 1913, we were in Rathlin Island for the purpose of watching bird migration. Owing to its size, and the nature of the covert, which at the time of our visit consisted of standing beans and barley, the place by no means came up to our expectations as a station for observation. Possibly, however, the following notes may be of some interest, as the birds in question are seldom recorded on migration from the north of Ireland.

WHEATEAR (*Æ. æ. leucorrhæa*).—All specimens obtained from different points of the island between September 15th and October 1st belong to this large Greenland race.

WHITE WAGTAIL (*Motacilla alba*).—About thirty of these birds, both adult and immature, were seen on September 12th to 13th at Ballycastle, on the mainland opposite Rathlin, in company with a much larger number of Pied Wagtails. A few couples and single birds were seen on September 15th, 16th, and 18th, also in association with Pied Wagtails.

MEALY REDPOLL.—On September 25th a female of this species was procured. It has been examined by Mr. Witherby, and pronounced to be of the Greenland race (*Carduelis l. rostrata*), which has hitherto only been recorded from Achill and the Tearaght in Ireland. This bird was accompanied by a male, which, however, was not secured.

TURTLE DOVE.—We saw one bird on September 24th.

EIDER DUCK.—Four ducks were noticed swimming off Church Bay on September 17th and 19th, and were then joined by a drake. On the 20th three birds were shot, and the others disappeared. On October 1st, however, four more ducks were seen at the same place. The islanders call this bird the "Shellduck," probably owing to the parti-coloured plumage of the male, and say that it is not uncommon in the spring and autumn round Rathlin. The lighthouse keepers say that as many as fifty or sixty are seen together at once.

As regards those species that are also resident on the island, there was, we think, some movement among Hedge-sparrows, and a considerable immigration appeared to take place on September 28th and 29th, but all the specimens procured were of British race.

On September 24th, a Redbreast, which, from the situation and the behaviour of the bird itself, we believe to have been a migrant, was flushed among the rocks by the sea-shore.

The Skylark and the Green Plover are both common breeding species, but the native birds had left by the second week of September, and the northern birds did not appear until the end of the month, when there was considerable immigration.

Goldcrests were constantly observed during the latter part of September, although never in large numbers. Swallows were only observed once—on September 19th—when three birds were seen. Pied Wagtails were constantly seen throughout September, but the Grey Wagtail only appeared on September 26th, when two birds were seen. Missel-thrushes, in a flock of seven, were observed crossing the island in a south-westerly direction, on September 25th, a day when considerable migratory movement was observed among several species.

Rathlin does not offer much inducement to the marine-feeding waders. Ringed Plover, Turnstones, and Red-shanks were common throughout our stay, but the Dunlin was only recorded on September 19th, and again on the 28th, five birds being seen at one time and two at another. A male Grey Plover was seen on September 29th and 30th. Terns were only observed once—on September 16th—and a single Shoveller was seen on fresh water on September 20th.

Regarding breeding species, it is perhaps worth recording the islanders' account of the extraordinary diminution of sea-fowl during the previous two summers. At one time "the birds could not move on the ledges without stepping on their eggs," but last year few were seen. This is attributed to the building operations connected with the new lighthouse that is being constructed close to the once famous rock

stack of Dun-Mohr, but this ought not to make any difference to the birds that breed on the north-eastern cliffs. It is worth noticing that it is recorded by Mr. Charles Kirk, in the *Scottish Naturalist* for October, that in 1913 Razorbills and Guillemots were both also very scarce upon Ailsa Craig, on the opposite side of the North Channel.

After Professor Patten's discovery of the Tree-Sparrow in Inishtrahull, we closely inspected the sparrows of Rathlin, but we found no sign of the Tree-Sparrow there. The House-Sparrow is tolerably common, although rather local, its distribution depending mainly upon the presence of thatched roofs. It has not yet spread to the lighthouse buildings on the east coast of the island, although it is common round the old thatched cabins a quarter of a mile away.

Maidenhead.

COLEOPTERA COLLECTED BY THE LATE H. L. ORR.

BY REV. W. F. JOHNSON, M.A., F.E.S.

THOUGH giving most of his spare time to work at the Hymenoptera, Mr. Orr picked up from time to time a number of beetles. Among them I have found many interesting species, which, when recorded in the *Irish Naturalist*, will form a monument "*aere perennius*" to the devotion of my late lamented friend to the study of nature. Prominent among these species is that beautiful Carabid, *C. nitens*. This handsome insect is very uncommon in Ireland, and there is no other recent record except that by the late Mr. Buckle from the Foyle district. It frequents heaths, and I have been informed is very fond, like others of its genus, of running over paths at dusk. *Leistus montanus* and *Pterostichus vitreus* are both mountain species. The former has not been previously found in Ulster. It seems to be fond

of the summits of mountains, where it is by no means easy to catch, as it hides among the heather. The latter, while showing a predilection for elevated situations, prefers boggy ground. *Bembidium concinnum* frequents the banks of rivers and estuaries, hiding among shingle. It is distinguished from its allies by its entirely pale antennae. *Aëpus marinus* is a curious little yellow beetle which like some others, lives on the sea-shore under stones below high tide mark, so that they must be at times submerged. *Tachinus pallipes* is very rare in Ireland; in fact there is only one other record of its occurrence, and that is by the late Mr. Buckle from the Foyle district. It is of northern distribution in the main, for the French records are for very high ground. *Bledius spectabilis* is one of the largest of its genus. These beetles burrow in sand or clay, digging galleries in which they live. Their presence may be detected by the little heaps of sand thrown up by them in the making of their burrows. They are generally found in company with various species of *Dyschirius*, which prey upon the larvae and pupae of *Bledius*. I have frequently found *Bembidium pallidipenne* with them, and it probably acts in the same way as *Dyschirius*. *Bledii* are commonly found on the sea-coast, but also occur in suitable localities inland. I have taken two species at Lough Neagh. The specimens of *Corymbites cupreus* are of the rare entirely green form and are males, which sex is far more commonly captured than the female.

The following species have not been previously recorded from Co. Antrim :—

<i>Chlaenius vestitus.</i>	<i>Soronia grisea.</i>
<i>Bembidium concinnum.</i>	<i>Nacerdes melanura.</i>
<i>Aëpus marinus.</i>	<i>Anthicus floralis.</i>
<i>Tachinus pallipes.</i>	<i>Apion miniatum.</i>
<i>Philonthus puella.</i>	<i>Dorytomus maculatus.</i>
<i>Bledius spectabilis.</i>	

Two species form new records for Co. Down :—

<i>Cercyon depressus.</i>
<i>Apion miniatum.</i>

In the following list I have taken "Belfast" as in Co. Antrim :—

- Carabus nitens*, L.—Carnlough.
Chlaenius vestitus, Payk.—Waterfoot.
Leistus montanus, Steph.—Slieve Glah, Co. Cavan.
Badister sodalis, Duft.—Belfast.
Pterostichus vitreus, Dej.—Slieve Donard.
Anehomenus angusticollis, F.—Moirá.
Bembidium nitidulum, Marsh.—Belfast.
B. concinnum, Steph.—Waterfoot.
Aëpus marinus, Ström.—Larne.
Dromius quadrimaculatus, L.—Shaw's Bridge.
Hydporus incognitus, Sharp.—Cave Hill.
Agabus unguicularis, Thoms.—R. Lagan.
A. paludosus, F.—Cave Hill.
Hydrochus elongatus, Schall.—Moirá.
Cercyon depressus, Steph.—Strangford.
Aleochara fuscipes, F.—Lurgan.
Tachinus pallipes, Grav.—Ballycastle.
Philonthus umbratilis, Grav.—Belfast.
P. puella, Nord.—Belfast.
Paederus riparius, L.—Holywood.
Stenus bifoveolatus, Gyll.—Belfast.
Bledius spectabilis, Kr.—Belfast.
Silpha dispar, Herbst.—Toome.
Onthophilus striatus, F.—Glenavy.
Soronia grisea, L.—Ballycastle.
Antherophagus nigricornis, F.—Cave Hill, "in nest of *Bombus*."
Corymbites cupreus, F.—Hilltown.
Malthodes marginatus, Latr.—Stormount.
Crepidodera rufipes, L.—Ram's Island.
Rhinosimus ruficollis, L.—New Forge.
R. planirostris, F.—Shaw's Bridge ; Ballycastle.
Nacerdes melanura, Schmidt.—Belfast.
Anthicus floralis, L.—Portrush.
Apion miniatum, Germ.—Whitehead, Strangford, Newcastle.
Tropiphorus tomentosus, Marsh.—Castlereagh.
Thryogenes nereis, Payk.—Moirá.
Dorytomus maculatus, Marsh.—Ballycastle.
Rhopalomesites Tardyi, Curt.—Cave Hill ; New Forge.

Poyntzpass.

THE ROSEATE TERN BREEDING IN IRELAND.

BY GEORGE R. HUMPHREYS.

For a considerable number of years, the Roseate Tern, *Sterna Dougalli* Mont., has been excluded from the list of Irish breeding birds. The late Mr. Ussher in his report on the birds of Clare Island¹ stated that the Roseate Tern had been rarely met with in Ireland for the last fifty years, but referred to a specimen shot on Clew Bay on the 3rd August, 1904, which would rather lead one to suppose that the species was breeding in Ireland at that time. In this connection Kirkman's "British Bird Book," page 65, contains the following passage in regard to Ireland: "There is a possibility that it still nests among the other terns on the west coast, although proof is still wanting." The only other specimen I can find recorded is a male which was killed by striking Hook Tower lighthouse, Co. Wexford, on the 30th April, 1897. This bird is in Mr. Barrington's collection, having been sent him in the flesh.²

It gives me much satisfaction to be in a position to put on record the nesting of the Roseate Tern in Ireland in 1913. Unfortunately the time at my disposal was very limited, and my observations were confined to two visits to the colony, both of short duration.

During the third week in July, while visiting a breeding colony of Common and Arctic Terns, I was attracted, almost immediately on my arrival, by the alarm-note of a tern which was flying around along with the commoner species. This note was a harsh "crake," and quite different from the note of any tern I had previously heard. The bird kept uttering its harsh note the whole time it was flying overhead, and consequently I had not much difficulty in picking it out, when I at once noticed it had a decidedly lighter coloured plumage than the rest, and appeared of a more slender build. By the aid of a pair of prism glasses I

¹ *Proc. R. Irish Acad.*, vol. xxxi., part 20, page 39.

² Ussher and Warren, "Birds of Ireland," p. 319.

examined it more closely, and now noticed the apparently black beak. Although the inclination was to put the bird down, there and then, as a Roseate Tern, I was not quite satisfied that the beak was black, owing to the poor light due to an overcast sky. In a short time, when the clouds had lifted, and the sun shone out, I returned to the spot. The bird was again flying about uttering its harsh "crake." Lying down on the ground I waited for it to come within close range of the glasses. In a few minutes I was rewarded with a clear view of the bird as it flew past, and was able to satisfy myself that the beak was quite black except for a small portion at the base, which was orange-red. I now noticed distinctly white lines extending down the primaries while the wings were expanded. During the whole time the tern was in the air it kept watching me very closely, and the peculiar movement of the head attracted my attention. This can best be described as a twisting movement, and not, strictly speaking, lateral. In about ten minutes the tern alighted on the ground within a few yards, when I saw that the tail feathers extended well beyond the tips of the wings. I was perfectly satisfied now that this was a Roseate Tern (*Sterna Dougalli*), notwithstanding the fact that the rose-pink on the breast appeared to be absent. While watching this tern I distinctly heard two others uttering a similar harsh "crake" as they flew around.

Soon after alighting the tern ran a short distance and was lost sight of. Creeping up quietly I had the pleasure of seeing it rise off an egg. On comparing this egg with those of the Common and Arctic Terns, I found it was of the distinct elongated type ascribed to the Roseate Tern, but remarked nothing peculiar as regards the colouring.

Two days after the discovery, another visit was paid to the colony. I was now surprised to find a considerable number of Roseate Terns. After going over the ground carefully, I came to the conclusion that there were about eighty Roseates in the colony, the great majority of them displaying the rose-pink on the under parts. One bird exhibited a much larger portion of orange-red on its beak than any of the others. I examined from twenty to twenty-

five undoubted nests of this rare species. These were spread over five different sites, each accommodating a nesting colony of Roseate Terns only. The largest number of nests in any one of these colonies was seven. The only exception to the foregoing was that of the tern recorded on my first visit. This bird had its nest nearer the edge of the general colony than any of the other Roseates, and amongst the nests of the Common and Arctic Terns. Out of the total number of nests examined, one contained two eggs; one a nestling and an egg just chipping; two or three single nestlings; and the remainder one egg each. In practically every instance where there were eggs, incubation was well advanced. It will be seen from this that the tendency was to hatch out one egg, although the full clutch is stated to consist of two eggs.¹ It was also apparent that the Roseates were later breeders than the other species. I have mentioned "nests," but really no nesting material was used by any of the birds.

As regards the colour of the eggs, there was little, if any, marked variation, the ground colour being light stone spotted and speckled with shades of brown, with underlying blotches or spots of ashy grey. Although in most cases the eggs were more elongated than those of the Common and Arctic Terns, it was difficult to find very much difference in some.

With regard to the nestlings, these were quite distinct from the nestlings of any of the other species. In the first place the upper parts were streaked with dark, on buff ground, whereas the dark markings on the nestlings of the Common and Arctic Terns are blotchy, and not so freely distributed over the surface. There is, however, another most important distinguishing feature, namely, the colour of the legs and feet; these were of a dark purplish-flesh, but there was a certain amount of transparency about this colouring giving it the appearance of pink tissue paper smeared with black ink. The nestlings examined by Mr. Mackay,² which had black legs and feet, were no doubt

¹ Kirkman's "British Bird Book," p. 66.

² *Auk*, xiii., p. 47.

more advanced in age than those examined by me, none of which were more than two days old. Dr. Louis Bureau¹ says the feet are blackish-brown during first days, and afterwards black.

Kylemore, Co. Galway.

NOTES.

BOTANY.

Uredo Lynchii.—A Correction.

In the *Irish Naturalist* for January, 1910, and April, 1911, *Uredo Lynchii*, Plowr. is recorded as an Irish species. In a recent paper entitled "Mycological Notes," by W. B. Grove in the *Journal of Botany* for February 1913, he points out that the fungus was wrongly named, and that it is really *Hemileia Phaji*, Syd. The name *Uredo Lynchii*, Plowr., must therefore be removed for the present from the list of Irish species. Grove's paper also mentions four other Irish species.

J. ADAMS.

Royal College of Science, Dublin.

Plants of the Saltees.—Correction.

In my list of Mosses and Hepatics of the Saltees (*Irish Nat.*, vol. xxii., p. 194), delete *Hypnum caespitosum*, *H. curvirostre*, and *Polytrichum sexangulare*, and insert *Hypnum illecebrum* and *Cephaloziella byssacea*.

H. W. LETT.

Loughbrickland.

Falcaria vulgaris in County Down.

It appears that the plant recorded at p. 18 of the last volume of the *Irish Naturalist* from Co. Down as *Ammi majus*, is *Falcaria vulgaris*, Bernh. (*Prionoa falcaria* of some authors). These two aliens have such a likeness to each other that the mistake can be easily accounted for. *Falcaria* is a native of Europe that has lately appeared in Kent, Hants, and Jersey, but I do not know of any record for Ireland. I may mention that in July last I visited the locality where Dr. Stansfield discovered the colony, and I was glad to find it flourishing. I took three stems, one of which I sent to Mr. Jas. Britten for the British Museum, and another I have given to Mr. Praeger.

H. W. LETT.

Loughbrickland.

¹ *Ornis*, vol. xiv., p. 302.

Erythraea littoralis at Portstewart.

Mr. J. E. Saul and I observed a species of a Centaury growing in damp spots in the sandhills at Portstewart, Co. Derry, which we both recognised as *E. littoralis*, Fries. He was familiar with this species on the Lancashire coast, and Mr. Somerville had once pointed it out to me growing on the Ayrshire coast of the Clyde. Mr. Saul found more of the same plant later on on the flats by the mouth of the river Bann.

E. littoralis had been found at Bangor and the Copeland Islands by Templeton and by Millen at Groomsport in Co. Down, and by Mackay at Portmarnock in Dublin County, but doubt was thrown on all these records, apparently only because it was considered a form of *E. Centaurium*. Whether *E. littoralis* be a good species and distinct from *Centaurium* is another matter, but I think there can be no doubt that it should have a place in the Irish list.

I sent some of our gathering to Mr. J. A. Wheldon, who replied "The specimens sent are undoubtedly *E. littoralis*, Fr., a similar form to that of our Lancashire coast. It has larger flowers and more scabrous calyx than original examples of Fries' plant which I have examined, or than the examples in Wittrock's *exsiccata* sub nom. *C. vulgaris*. I have in my herbarium separated this form as var. *occidentalis*."

I also found a dwarf form of *E. Centaurium* growing, not on the sand, but on marshy banks by the sea, which is evidently the var. *capitatum*, and which is probably the plant from Portstewart named *E. latifolius* in Dickie's Flora of Ulster. This variety seems to be merely a state caused by the grazing of cattle.

C. H. WADDELL.

Greyabbey, Co. Down.

ZOOLOGY.**Schoenobius mucronellus in County Fermanagh.**

I was out collecting Lepidoptera on the shores of Upper Lough Erne on July 17th last, and about 10 o'clock at night I took one specimen of *S. mucronellus*, flying over some Equisetum (I am not certain of the correct name of the plant, but it was an Equisetum or Hippuris). On looking up *S. mucronellus* on Mr. Kane's "Catalogue of the Irish Lepidoptera," I found that only one specimen of this insect had been taken in Ireland when he published his book, so determined to try for others. I thought I would try the next night round some Equisetum growing round the edge of a small lake on this demesne. Owing to the swampy nature of the bank, I could not get near the patch of horsetail, so went in a boat, and directly it was dark I took 7 specimens flying over this plant; I found them difficult to distinguish on the wing from the innumerable caddis flies and *Hydrocampa nymphaeata* that were also on the wing, but their flight was somewhat faster. I went again the next night and took 5 more, but stupidly left this lot in their pill-boxes all night, and next morning I found they had all damaged themselves and were useless as specimens for

the cabinet. Both nights the flight time only lasted about half an hour. Unfortunately I had to go away after the second night's work here, and did not get back until the insects were "over," but hope to try again next year and find out more about their habits.

CHARLES LANGHAM.

Tempo Manor, Co. Fermanagh.

Lepidoptera and Coleoptera from County Waterford.

During a week's visit to Waterford last June from the 19th to the 26th, I managed to do a little collecting and revisit three of my old hunting-grounds. At Milepost I found the Greasy Fritillary (*Melitaea aurinia*), in the same bit of marshy ground where I had first met with it in 1897. I also took here a male specimen of *Nemeophila russula*, and saw one or two others. In a small fir plantation close by I captured a specimen of the local moth, *Bupalus piniaria*, and one of *Thera variata*. To these may be added to complete the day's "bag," *Phytometra viridaria*, *Phragmatobia fuliginosa* and a few other commoner species. Two visits were paid on the 20th and 25th to the extensive sandhills near Tramore, and the following beetles taken amongst others: *Broscus cephalotes*, *Harpalus tardus*, *Silpha tristis* (one specimen), *S. atrata* var. *subrotundata*, *Aphodius scybalarius*, *Aegialia arenaria*, *Scricabrunnea*, *Phyllopertha horticola*, *Lacon murinus*, *Timarcha tenebricosa* (a dead specimen but intact), *Heliopathes gibbus* (common), *Otiorrhynchus atroapterus* (common), *Philopodon geminatus* (abundant, a large pale form also occurred), *Sitones griseus*. A couple of hours' collecting in the woods of Curraghmore on the 24th did not produce all the good things I had anticipated, doubtless owing to the unfavourable weather. I only took two moths—*Thera variata* and *Cidaria populata*, but had more success with the beetles. By beating oak trees and sweeping the under-growth composed chiefly of *Vaccinium*, I obtained *Adrastus limbatus*, *Corymbites quercus*, *Telophorus pellucidus*, *T. figuratus**, *T. bicolor*, *T. flavilabris*, *Rhagonycha limbata**, *R. pallida*, *Leiopus nebulosus* (two specimens), *Polydrusus tereticollis*, *P. cervinus*, *Phyllobius oblongus*, *P. argentatus*, *Hypera rumicis*.

The species marked with an asterisk are, I believe, new records for Waterford. My best thanks are due to Messrs. W. F. Johnson and O. E. Janson, for naming some of the beetles.

L. H. BONAPARTE WYSE.

Ealing Common, London, W.

Testacella scutulum in King's County.

Within the last few weeks I have received specimens of *Testacella* from two localities in King's County. No *Testacella* had hitherto been found in the central parts of Ireland, all previous records having been more or less confined to the maritime counties of the south and east. The geographical distribution of the three species of *Testacella* found in Ireland is very clearly indicated by Mr. Praeger's ingenious method in Mr. Stelfox's

paper on Irish Mollusks. (*Proc. Royal Irish Acad.*, vol. xxix. (B), 1911). Although the range of the three species is somewhat similar, *Testacella scutulum* has a more distinctly eastern distribution than the two others. The first specimens were sent to me from Birr by Miss M. J. Delap, who knew *Testacella* well, having previously noticed it on her native Valencia Island. Miss Delap observed it in Birr in an old garden which had been much neglected for many years and is now occupied by Miss Stoney. Miss Stoney has kindly forwarded another specimen since. The orange colour and the characteristic form of the dorsal grooves proved these specimens to belong to *Testacella scutulum*. Another *Testacella* of the same species from near Birr in King's County, was found in an old garden at Oxmantown, and sent by Mr. Edward Clarke to Professor Carpenter for identification.

R. F. SCHARFF.

National Museum, Dublin.

Peculiar Nesting Site of Black Guillemots.

During the last two nesting seasons the Black Guillemots (*Uria grylle*) have taken to the much frequented piers of Bangor and Ballywalter both situated in the County of Down, for their nesting operations. In the *Northern Whig* for September 20th and 27th, a correspondent gives a clear description of these birds which nested at Bangor Pier, and my friend Mr. Hughes of Ballywalter, a most careful observer gave me a full description of this species, and tells me it has nested between the stones of the Ballywalter Pier for the last two years and probably longer. I am glad to say the coastguards protect these birds, and it is quite easy to get within a couple of yards of them as they sit on the pier wall.

It is a most extraordinary thing that such wild birds as these should nest in such frequented places. The only way I can account for it is that their old breeding haunts in Rathlin have become congested, and these birds have flown over to the County Down shore to look for a site, but could find no rocky crevices to make their nest in, and took to the above-mentioned piers as the best substitute for the cliffs.

W. H. WORKMAN.

Belfast.

Departure of Spotted Flycatchers.

Referring to Canon Flemyng's note (p. 219 *ante*), it may be interesting to record the latest date on which the Spotted Flycatcher, *Muscicapa griola*, was seen here for the past thirteen years, 1901—11th September; 1902—4th September; 1903—21st September; 1904—9th September; 1905—10th September; 1906—15th September; 1907—3rd September; 1908—23rd August; 1909—4th September; 1910—25th August; 1911—11th August; 1912—12th August; 1913—15th August.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

REVIEWS.

BIRD BOOKS, LARGE AND SMALL.

The British Bird Book : Edited by F. B. KIRKMAN, B.A. Oxon., Parts XI. and XII. London and Edinburgh : T. C. and E. C. Jack.

Mr. Kirkman is to be warmly congratulated on the successful completion of his great task in editing the "British Bird Book," of which the concluding sections (11 and 12) are now before us. The importance and value of the book must be universally acknowledged. That there were features in the scheme of arrangement to which exception might be taken was obvious from the first, and was hardly a demerit in the scheme itself. The aim of the contributors generally (but particularly of the Editor, in those parts for which he is directly responsible), has been to concentrate attention on the results of field study—in other words, on the habits of those birds that normally spend part of their lives within the British area. With this object a vast amount of individual observation from many sources has been collated and presented so as to form a trustworthy and readable whole ; and the beauty of most of the illustrations (particularly the coloured plates) is such that we can only repeat our regret at the exclusion of a few species—for no apparent cause—from the distinction of having their portraits given.

In parts XI. and XII., we have chapters on the Ducks, Ciconiiformes (Steganopodes and Herodiones of the more generally familiar classification), Petrels, Grebes, and Divers. Most of the articles in these sections are by Mr. Pycraft, but Mr. Jourdain deals with the Diving Ducks, Spoon-bill, Glossy Ibis, and Divers, while Mr. Hartert treats of the Cormorant and Shag, Mr. Kirkman of the Gannet, and the section on the Little Bittern is the result of collaboration between Messrs. Jourdain and R. B. Lodge. There are five important supplementary chapters, dealing with rare birds, structural characters, migration, the study of bird-behaviour, and bird-photography. To Irish naturalists (as such) the first of these will be of interest as exhibiting the attitude of the authors towards those American "strays" that have sometimes been set down as bona-fide wanderers to our own shore, and at other times bracketed or ruled out as either inadequately vouched or quite incredible.

Of these we find that the two Cuckoos (Black-billed and Yellow-billed) which were bracketed by Mr. Ussher in deference to the specimen of Mr. Howard Saunders, are restored to their old position as genuine stragglers, while the American Goshawk is placed on the border line as possibly entitled to like acceptance. Otherwise, the brackets for Irish visitors correspond to those used in Mr. Ussher's list. The verdict on the Purple Martin in the Museum is that it was probably an escaped bird, if genuine. The suggestion of an escape in the case of such a bird as a swallow sounds a little far-fetched. Even at the present day it would be one of the worst possible subjects for transportation in captivity ; and how this could have been done with an American bird in 1839, when ocean voyages were much slower than they are now, nearly passes comprehension.

The chapter on structural characters is drawn up by Mr. Pycraft, and will be of much use to those who wish to understand some of the difficulties attaching to a proper system of classification and arrangement. The classification followed in the Bird-Book is in the main that of Dr. Gadow, which is also followed by Mr. Evans in his volume on Birds in the "Cambridge Natural History"; but in the case of the Passeriformes the Editor states that the arrangement of Families is new, and based on the researches of Mr. Pycraft. This makes it the more remarkable that Mr. Pycraft in his own arrangement concludes the Passeriformes with the Swallows—a feature in previous lists which he seems to condemn on p. 559 as due to the desire of amateurs to make an easy transition from Order to Order by suggesting imaginary links. In his "key to classification" Mr. Pycraft does not himself, even as regards Orders, adhere fully to the system followed in the text of the book, for he suppresses the "Cuculiformes," and makes the Cuckoos a mere suborder (Cuculi) of the Order Coraciiformes. The total number of Orders of British birds is thus reduced to ten, as compared with seventeen recognised in Saunders' Manual. As all our existing local and county faunas follow the arrangement of the last-named volume, it must for a long time remain the most familiar to students of bird-life; but this is no reason why we should not be pointed out the way to a better grouping, even though, as Mr. Pycraft admits, the best must yet be regarded as only tentative.

It is, however, as a summary of what is so far known of the habits of British birds that the fine work now completed will be most prized. In former reviews (*Irish Nat.*, vols. xix. 248; xx. 159; xxi., 123; and xxii., 53), we have drawn attention both to the great merits and to some of the oversights discernible in the various parts as they successively appeared. We are still inclined to say that while the accounts of nuptial displays which make so large a feature in most chapters are of incontestable value, their bearing on the question of sexual selection is far less clear than it would be if due attention had also been paid to the manner in which plumage is either displayed or exposed during combat or defiance. Is the display before the female, it may be asked, a successful demonstration of untarnished prowess in war, or has it no other object than to gratify an aesthetic sense through which all the females of the species have from time immemorial selected their mates according to a uniform but apparently quite arbitrary standard of beauty? Mr. Kirkman himself does not entirely omit this aspect of the question. In the eleventh section, for example, he shows that the nuptial display of the Gannet is in some features a repetition of its battle display. But this subject has not received, on the whole, its proportionate share of notice. The meaning of egg-coloration, too, has been very spasmodically touched, and might well have formed matter (especially after what Mr. Kirkman had said of the eggs of the Guillemot) for a supplementary chapter. But the Bird-Book is assured of a high and permanent place in our ornithological literature, and the Editor and all his contributors may be justly proud of their share in its production.

C. B. M.

British Birds : Description of all the Commoner Species, their Nests and Eggs. By F. B. KIRKMAN, B.A., Oxon. Illustrated by A. W. Seaby. (The People's Books). London & Edinburgh. T. C. and E. C. Jack. Price 6d.

We cannot complain of the want of cheap guide-books to the study of British birds, when we have before us the excellent little sixpenny manual which Mr. Kirkman—one of our best ornithological authorities—has contributed to the "People's Books" series. Illustrated with copious wood-cuts due to the skilled hand of Mr. Seaby, it should enable the beginner to recognise at sight most of the common birds that he is likely to meet in any part of the British Islands. The plumage, nest, and eggs of each species are accurately—though, of course, briefly—described, and the geographical range within the Britannic area is in all cases at least roughly outlined. The brevity of the references to Ireland would, however, make it absolutely incumbent on any Irish beginner using Mr. Kirkman's book to check it with frequent reference to the "List of Irish Birds" drawn up for the Museum by Mr. Ussher. Otherwise he might be left under the erroneous impression that the Jay is a bird of general occurrence in Irish woods, and that the Stonechat is scarcely so common a bird with us as the Whinchat. The phrase "exceptional in Ireland," as applied to the Short-eared Owl, strikes us as rather vague, but seems, from its context, to imply that this owl has bred here, of which we have no evidence. The description of the Tree-Pipit as "absent Ireland," has, of course, ceased to be strictly accurate since the book was sent to press; and of the elasticity of the phrase "rare in Ireland" it may suffice to say that Mr. Kirkman applies it alike to the Green Woodpecker and to the Kingfisher. But these are matters of no moment, unless to an Irish tyro who neglects to avail himself of the opportunities at his doors. The classification followed is that used in the "British Bird-Book," edited by the author of this little manual.

C. B. M.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Rabbit from Miss Egan, a number of Guinea-pigs from Mr. A. Miller, a pair of Swans from Mr. W. M. Murphy, and two Barn Owls from Miss G. and Mr. R. Armstrong.

The pair of American Bison given by the Canadian Government are now on view in an extensive paddock that has been opened up close to the entrance gate, so that these interesting animals—no specimen of which has been on view in Dublin for nearly twenty years—are the first seen by visitors coming into the gardens.

DUBLIN NATURALISTS' FIELD CLUB.

NOVEMBER 18.—Annual Conversazione, in the Royal Irish Academy House, by permission of the Council. The proceedings opened at 7.30, when refreshments were served. At eight o'clock the chair was taken by the Vice-president, N. COLGAN, in the unavoidable absence of the President. In his opening remarks, the Chairman referred to the great loss which the Club and natural history in Ireland had sustained by the death of Mr. R. J. Ussher. Professor A. HENRY then delivered an address "On some points in the History of Irish Trees." This was illustrated by lantern slides, and proved highly interesting. He dealt mainly with the Scotch Fir, *Pinus sylvestris*, and discussed the question whether it had become extinct in Ireland and had then been reintroduced. The remainder of the evening was spent in examining a large series of natural history exhibits on view.

DECEMBER 9.—W. F. GUNN (President) in the Chair. A number of natural history specimens were exhibited, and afterwards Professor CARPENTER read a paper on the Irish marine Bristle-tails of the genus *Petrobius*, illustrated by lantern slides. This paper has already appeared in the *Irish Naturalist* (vol. xxii., pp. 229, f.) Nominations of office-bearers and Committee for 1914 were made.

CORK NATURALISTS' FIELD CLUB.

JUNE 11. EXCURSION TO THE SHOURNAGH VALLEY.—A party of 17 travelled from Muskerry station to Gurth station, and investigated the flora of the valley which at this point has considerable interest. Among the plants were:—*Osmunda regalis*, *Pinguicula grandiflora*, *Drosera rotundifolia*. Having visited some archaeological remains in the neighbourhood, including the very large rath at Lis-na-ragh, and two large pillar-stones at Killowen, the members entered the woods at St. Anne's Hill, where many characteristic woodland plants were found. The party returned from St. Anne's Station. J. Noonan acted as conductor.

JULY 16. EXCURSION TO LOTA LODGE.—By permission of Mr. A. F. Sharman-Crawford, his beautiful gardens at Lota Lodge, Glanmire, were visited. Mr. A. Pearson received the members and showed them over the grounds.

JULY 26. EXCURSION TO MYRTLEVILLE.—A party of members travelled by train to Crosshaven for the study of marine algae at Myrtleville strand. The identification of species, floating out of specimens, &c., were explained by the conductor, Miss E. P. Duke, B.Sc., who was assisted by Miss M. Dobbin, B.Sc. The following species, most of which were found washed up on the shore, were noted. (Those marked (r) were found growing on rocks). RHODOPHYCEAE:—*Porphyra laciniata* (r.), *Ceramium rubrum*, *C. diaphanum*, *Furcellaria fastigiata*, *Dumontia filiformis*, *Delleseria sanguinea*, *D. alata*, *Nitophyllum laceratum*, *Ahnfeltia plicata*, *Gigartina mamillosa*, *Chondrus crispus* (r), *Rhodomenia palmata* (r), *Chylocladia articulata* (r), *Plocamium coccineum*, *Laurencia pinnatifida* (r), *Polysiphonia fastigiata*,

Dasya coccinea, *Corallina officinalis*. PHOEOPHYCEAE :—*Fucus platycarpus* (r), *F. vesiculosus* (r), *F. serratus* (r), *Pelvetia canaliculata* (r), *Ascophyllum nodosum*, *Halidrys siliquosa* (r), *Dicytota dichotoma*, *Cladostephus verticillatus*, *Chordaria flagelliformis*, *Leathesia tuberiformis*, *Desmarestia aculeata*, *Chorda filum*, *Laminaria digitata*, *L. saccharina*, *Alaria esculenta*. CHLOROPHYCEAE :—*Enteromorpha compressa*, *Ulva Lactuca*, *Cladophora sericea*.

JULY 30. EXCURSION TO THE FATHER MATHEW TOWER.—The members walked from Dunkettle Station to the Tower, which was examined and ascended. Near the Tower are two oak trees, one of which was planted by Father Mathew 67 years ago. Many interesting plants were found in the wood adjacent, and in the Dunkathal demesne, through which the party returned. M. Holland acted as conductor.

AUGUST 23. EXCURSION TO DUNSCOMBE'S WOOD.—A party under the guidance of John Griffin walked from Wellington Bridge to the wood, the study of indigenous trees and woodland plants being the chief object of the visit. In the wood and by the wayside, 26 species of trees were found.

SEPTEMBER 3. EXCURSION TO ARDRUM WOODS.—A party of 25 travelled to Cloghroe railway station, the members being shown through the woods (which are several hundred acres in extent, and very interesting from the point of view of forestry) by Miss H. Curry. It was learned that Squirrels are now well established in the woods, and increasing in numbers.

SEPTEMBER 10. VISIT TO MUNICIPAL MUSEUM.—A large party visited the Municipal Museum, Fitzgerald Park. T. Farrington, M.A., showed the members over the scientific portion of the collection, its artistic and archaeological side being in the hands of M. Holland.

NOVEMBER 26. CONVERSAZIONE AT UNIVERSITY COLLEGE.—Professor I. Swain presided, and there was a large attendance of members and their friends. Lectures, with lantern illustrations, were delivered on "The Past in the Present," ; "Connecting Links in Plant Life," and "Pond Life," by Sir Bertram Windle, F.R.S. (President, University College), Professor H. A. Cummins and Professor Hartog respectively. Professor Swain showed a number of slides illustrating glaciers. Some botanical, zoological, and geological objects were exhibited in the Biological Laboratory. They include specimens of native marine algae, collected in 1807. Tea was served in the Students' Club during an interval.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

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JOHN TEMPLETON'S NOTES ON IRISH LAND AND FRESH-WATER MOLLUSCA.

BY A. W. STELFOX, M.R.I.A.

A manuscript bearing the title "Catalogue of Irish Shells, by John Templeton, Esqr.," in the handwriting of the late G. C. Hyndman (?), of Belfast, has recently been discovered in a drawer of the Hyndman collection of shells now in the Belfast Municipal Museum. The following extracts relate to the land and fresh-water species mentioned in the MS., all of which is in the handwriting of Templeton. Here and there notes and marks have been added in pencil by Mr. Hyndman (?). The remainder of the MS. refers to marine species.

LIST OF LAND AND FRESH-WATER SHELLS MENTIONED IN TEMPLETON'S CATALOGUE.

"MYA."

- 13.¹ "*Margaritifera*. [*Margaritana margaritifera* (Linné²)].
In the Lagan and other Irish Rivers."

"TELLINA."

29. "*Cornea*. T. with a globose smooth horn coloured shell with transverse furrows.

Lin. Trans. 8. 59. And Lin. Trans. 3. t. 13.

f. 39, 40. *Cyclas* Lamarck.

[*Sphaerium corneum* (Linné).]

Drains in the Bog Meadows.

- amnica*. T. with an oblique somewhat oval transversely furrowed shell having the hinge not exactly in the middle but most towards [sic] one side.

T. rivalis, Lin. Trans. 3. 44. t. 13. f. 37-38. Vol. 8. 60.

[*Pisidium amnicum* (Müller).]

Found in the Lagan near Lisburn. 27 Sep. 1817."

¹ The numbers refer to those in the MS. Some species, perhaps added at a later date, have no numbers prefixed.

² I give the modern synonymy as used in the List of L. and F. W. Mollusks of Ireland, *Proceedings R.I. Acad.*, xxix., Section B., no. 3, 1911.

“MYTILUS.”

79. “*Cygneus* [*Anodonta cygnea* (Linné).]
Lakes in the C. Monaghan, &c. In the Friar’s
Glen the Reservoir of the Head level of the
Lagan Canal, Sept. 27. 1817.”

“VOLUTA

- 86B. *denticulata*. Lin. Tran. 8. 130. Mon. t. 20. f. 5.
[*Phytia myosotis* (Drap.), var. *denticulata* Mont.]
Found by Miss Templeton at Bangor—1818.”

“TURBO.”

108. “*Ulvæ*. [*Paludestrina stagnalis* (Baster).]
Common on the *Zostera* in Belfast Lough.”
- 110-1. “*Fontinalis*. Lin. Tran. 8. 168. Mont. p. 22. f. 4.
[*Valvata piscinalis* (Müller).]
In the Canal &c.”
- 110-3. “*Nautilæus*. Lin. Tran. 8. 169. p. 4. f. 4.
[*Planorbis crista* (Linné).]
On the leaves of *Potamogeton Natans* in the
Rushy bog drain.”
113. “*Perversus*. Lin. Tran. 8. 181. Shell turret like,
spires contrary, striated and the aper-
ture without teeth.
[*Balea perversa* (Linné).]
Common among moss.
114. *Muscorum*. [? *Pupa cylindræa* (Da Costa).]
Found but forget to mention where.”

“HELIX.

stagnalis.

Lymnæa stagnalis Lamarck.

[No locality given here. See below.]

115. *planorbis*. [? *Planorbis umbilicatus* (Drap.).]
[No locality given.]

116. *Vortex*. [? *Planorbis vortex* (Linné).]
Ditches.

117. *Cornea*. [? *Planorbis corneus* (Linné).]
In a rushy bog drain. July 19. 1810.

118. *Contorta*. Lin. Tran. 8. 191. Mon. [p.] 25.
[*Planorbis contortus* (Linné).]
In the Lagan. In the Rushy bog Drain.

119. *Fontana*. Lin. Tran. 8. 193. Mon. 462. p. 6. f. 6.
[*Planorbis fontanus* (*Lightfoot*).]
In freshwater, &c.
paludosa. [? *Vallonia pulchella* (*Müller*).]
Found composing the covering of Cadworms [sic]
along with *Turbo fontinalis*, and *Helix tenta-*
cula.
In the Friar's Glen. Sepr. 27. 1817.
120. *Ericetorum*. [*Helicella itala* (*Linné*).]
Sand hills on the shore at Ballycastle and near
Bangor.
121. *Rufescens*. [*Hygromia rufescens*, auct.]
Found among grass and moss in the orchard.
Found common on the Limestone Rocks near
Cork with the *Helix virgata* by Dr. Flemming.
Wern. Tran. 395. [The latter note is added
in Pencil; but appears to be in Templeton's
writing. A. w. s.]
122. *Nitens*. Lin. Tran. 8. 198.
Found on the rocks at the cave hill. Common
among moss.
[The name *Helix nitens* probably covers all the
larger species of the genus *Hyalinia*. A. w. s.]
123. *Hispida*. [*Hygromia hispida* (*Linné*).]
Among moss.
124. *Radiata*. Lin. Tran. 8. 199. Mont. t. 24. f. 3.
[*Pyramidula rotundata* (*Müller*).]
Among moss.
- 124-I. *umbilicata*. Lin. Tran. 8. 200. Mont. t. 13. f. 2.
[*Pyramidula rupestris* (*Drap.*).]
Found among moss, under the decaying bark
of Trees, &c.
125. *Arbustorum*. [*Arianta arbustorum* (*Linné*).]
Sandy braes near Larne. Rocks at the Cave
hill, and found by Mary Templeton in Malone
farm.
126. *Nemoralis*. [*Helix nemoralis* *Müller*.]
Common.

127. *Hortensia*. [? *Helix aspersa* Müller.]
Common."
130. "*Bifasciata*. Lin. Tran. 8. 210.
[*Helicella barbara* (Linné).
On sandhills about the shore.
Stagnalis. Lin. Tran. 8. 214. Brit. Zool. t. 86. 106.
Don. t. 51. f. 2. Mon. 367. t. 16. f. 8.
[*Limnæa stagnalis* (Linné).]
Found on the shore of Lough Neagh.
131. *Lubrica*. Lin. Trans. 8. 213. Brit. Zool. t. 82. f. 118.
Mon. 390. t. 22. f. 6.
[*Cochlicopa lubrica* (Müller).]
Found in the orchard, May 16, 1812.
132. *Succinea*. Lin. Tran. 8. 218. Don. 168. 1.
H. putris Mon. 376. t. 16. f. 4. Don. 168. 1.
[*Succinea putris* (Linné).
In the mill race at Seymour Hill and many other
places.
133. *Putris*. Lin. Tran. 8. Mon. 373. t. 16. f. 3.
H. peregra, Mon. 373.
[*Limnæa pereger* (Müller).]
Found at Lyster's spring and many other places.
134. *tentaculata*. Lin. Tran. 8. 220. Brit. Zool. t. 86. 140.
Don. t. 93.
[*Bithynia tentaculata* (Linné).]
Found at the second lock of the Lagan. July,
29, 1799.
135. *Auricularia*. [*Limnæa auricularia* (Linne).]
In the rushy bog drain.
136. *Glutinosa*. [*Amphipeplea glutinosa* (Müller).]
In the rushy bog drain."
138. "*Bulloida*. H. with a smooth shining ovate fragile
shell with the spiral turns contrary
and short. Lin. Tran. 8. 223.
Don. 168. f. 2.
[*Physa fontinalis* (Linné).
Found by Miss Templeton on the seashore at
the mouth of a rivulet near Bangor. Found

by myself among reeds thrown out of a drain
at the Rushy Bog, Augt. 26, 1817."

"PATELLA."

146. "*Lacustris*. [*Ancylus fluviatilis* Müller.]

On stones in the Lagan, &c.

147. *Oblonga*. [*Acroloxus lacustris* (Linné).]

On the Potamogeton &c. on the drains in the
bog meadows."

The above records are almost all from the neighbourhood of Belfast and are of great interest to a student of the local Mollusca. I feel sure, however, that there are a few cases of misidentification to be dealt with.

INTERESTING OR DOUBTFUL RECORDS CONTAINED IN THE MS.

Helix Vortex. I think this must be referred to *Planorbis spirorbis*, L., var. *leucostoma*, Millet, rather than to *Planorbis vortex*, L. The former shell is abundant in the habitats, such as the Bog Meadows, mentioned by Templeton and has been frequently confounded with *Planorbis vortex*.

Helix Cornea. This can scarcely be *Planorbis corneus*, L. It is more than likely that Templeton intended to record *Planorbis carinatus*, Müller, or *P. umbilicatus*, Drap.

Mya margaritifera. No subsequent writer mentions this shell as found in the Lagan. There is no need to doubt the record however.

Turbo Perversus. It is strange that Templeton should record *Balea perversa* and not mention the much more common *Clausilia bidentata*. Yet since he states that his *T. perversus* has "the aperture without teeth" there can be no doubt that it was *Balea* which he referred to, unless he had only seen young shells of *Clausilia*.

Helix planorbis. This probably refers to *Planorbis umbilicatus*, Drap., which is common in the coastal marshes between Belfast and Holywood.

Helix paludosa. It is strange that *Vallonia pulchella* (= *Helix paludosa* of Da Costa) could be found composing the covering of caddis-worms, yet this species is

common on the railway bridge over the canal at Moira station, less than half a mile from the locality mentioned by Templeton. The shells of this species are, however, frequently found in flood debris, and I have on at least one occasion found them on the covering of a Caddis-fly larvae.

Helix Ericetorum. Both the localities given in the MS. for this species are new to me. It is found at Kinbane Port, $2\frac{1}{2}$ miles west of Ballycastle, in Co. Antrim, and no doubt occurred in former times on the sand-dunes at Ballycastle. There is, however, no other record for this species from Co. Down, although its ally *Helicella barbara* is frequent round the coast. The sandy area near Orlock Point, east of Bangor, may perhaps contain some deposit in which dead shells of this species may still linger.

Helix umbilicata. I am afraid that here we have another case of misidentification, because "*Helix umbilicata*, Mont. t. 13. f. 2" (= *Pyramidula rupestris*, Drap.) does not frequent the under side of "decaying bark of Trees."

It is possible that Templeton may have mistaken the young of some other species for *P. rupestris* or that the shell referred to was the *Pupa umbilicata* of Drap. (= *Pupa cylindracea*, Da Costa).

Helix arbustorum. The "Malone farm" referred to as a habitat for this shell must be somewhere near Shaw's Bridge, Belfast.

Helix hortensia. This cannot be referred to *Helix hortensis*, Müll., which is very rare in NE. Ireland. *Helix aspersa* was of course the *Helix hortensis* of many early English writers, such as Pennant.

Helix Auricularia. I have been unable to trace the exact locality referred to so frequently in the MS. as "the Rushy Bog;" but I am inclined to refer it to the swampy ground between the second lock on the Lagan Canal and the old pumping station. This would be within half a mile of Templeton's house, Cranmore, and probably one of his favourite hunting grounds. It may

have been in the Bog Meadows, now partially destroyed by drainage and building operations. *Limnaea auricularia* is not now known to live in any of the drains by the Lagan, near Belfast, but it does occur in the Galwolly Pond, Belvoir Park, which is close to the second lock of the canal, but on the Co. Down side of the river. *Helix Glutinosa*. Not now known to live nearer Belfast than the Lough Neagh basin.

There are many strange absentees from the above list, such as the various species of *Pisidium*, *Vertigo*, *Clausilia bidentata*, and the smaller *Helices*. I am inclined to regard this MS., therefore, as only showing us a part of Templeton's work in this branch of natural science.

Belfast.

ON REFERENCES BY W. E. LEACH TO IRISH LAND AND FRESH WATER SHELLS.

BY A. W. STELFOX, M.R.I.A.

In 1820, "A Synopsis of the Mollusca of Great Britain, by William Elford Leach, M.D., F.R.S., &c.," was in the press; but owing to the ill health of the author the work was abandoned. In 1852, however, it was published in its original form under the editorship of Dr. J. E. Gray, of the British Museum. It contains several references to Irish Mollusca, two of which are of considerable interest. They are as follows:—

Page 71. *Teba caeperata*, Mont. [= *Helicella intersecta*, Poir.].¹ "Sparingly in the south of Ireland."

Page 75. *Zonites rupestris*, Drap. [= *Pyramidula rupestris*, Drap.]. "On the Reeks, near Killarney."

Page 77. *Chilotrema lapicida*, L. [= *Helicigona lapicida*, L.]. "In the south of Ireland."

Page 79. *Elismia fasciata*, Pennant [= *Helicella barbara*, L.]. "On most of the sandy shores in the south of Ireland."

¹ The synonyms given are from the List of L. and F. W. Mollusks of Ireland. *Proceedings, R.I. Acad.*, xxix., Section B., no. 3.

Page 81. *Ena obscura*, Müll. "I observed it once near the Eagle's Nest Rock, on the Lake of Killarney."

Page 98. *Alexia denticulata*, Mont. [*Phytia myosotis*, Drap., var. *denticulata*]. "I found it likewise at the mouth of the Cork river; and at Dungarvan, in Ireland, in abundance."

Page 116. *Planorbis imbricatus*, Müll. [= *Planorbis crista*, L.]. "I found it in a marsh near Dunloch Gap, and again at Muccross, near Killarney."

Page 322. *Damaris elongatus*, Lam. [= *Margaritana margaritifera*, L.]. "In the Ban, Ireland."

It is evident from the above records that Leach must have done a considerable amount of field work in the south of Ireland prior to 1820. Of the above references those to *Ena obscura* and *Chilotrema lapicida* are the most interesting. The record of the latter species is not, however, given on the personal authority of Dr. Leach, and is, therefore, of little value, as Thompson¹ could not satisfy himself that *C. lapicida* had ever been found in Ireland as a native. No Irish specimens have been forthcoming since the publication of Thompson's "Catalogue" in 1840, indeed in vol. iv. of his "Natural History of Ireland," the reference to *C. lapicida*, referred to in footnote, is omitted. It would seem, therefore, that the belief that this species lived in Ireland was not well founded.² It must be remembered, however, that in many of its habitats in England, *C. lapicida* is not now so plentiful as in former times, while in not a few localities it has become extinct.

Dr. Leach's record of *Ena obscura* from near Killarney can scarcely be doubted, even though this shell has not been reported from this district within recent years. It would be wise, however, before adding the name *E. obscura* to the fauna of North Kerry to have the record verified.

Belfast.

¹ See W. Thompson. Cat. Land and Fresh-water Mollusca of Ireland. *Ann. and Mag. Nat. Hist.*, Sept., 1840.

² [See below Mr. R. A. Phillips' account of his rediscovery of this species. —Eds.]

HELICIGONA LAPICIDA IN IRELAND.

BY R. A. PHILLIPS, M.R.I.A.

Early in November last I was informed by Mr. E. Collier, of Manchester, that Mr. L. E. Adams had sent him specimens of *H. lapicida*, L., reported to have been collected in Ireland, along with a short paper, to be read at the forthcoming meeting of the Conchological Society on November 12th, saying that they had been taken at Carrig-a-brick Castle, near Fermoy, Co. Cork, forty-two years ago by Mr. E. Dukinfield Jones, of Reigate. Through the kindness of Mr. Jones, the specimens have been deposited in the National Museum, Dublin.

In order to verify this report and see if the mollusk still lives in the locality, I visited Carrig-a-brick a few days after receiving Mr. Collier's letter, and was very pleased to find, after a short hunt, three living and two dead specimens under stones by a wall at the edge of the wood near the castle associated with *Hyalinia cellaria*, *H. lucida*, *Arion hortensis*, *A. intermedius*, *Hygromia rufescens*, *H. hispida*, *Pupa cylindracea* and *Clausilia bidentata*.

Mr. Jones states that he also found *Ena montana* in the Fermoy district at the same time, but, probably owing to the short time at my disposal and the lateness of the season, I found no trace of that species.

These two shells are widely distributed on the Continent, occurring also in England, chiefly in the southern counties, and are most interesting additions to the known fauna of Ireland.

Mr. Collier writes me that Mr. E. Dukinfield Jones is an entomologist, and only collected a few shells when he came across them in his rambles, and, so, this record was not made public until Mr. Adams, who also lives in Reigate, made his acquaintance and during conversation, got the news from Mr. Jones.

Mr. A. W. Stelfox informs me that *H. lapicida* was recorded from Cove, Co. Cork by Turton, and *Ena montana* from Down and Queen's County by Captain Brown, but no other collectors have seen them and there are no specimens in existence from these localities, so they have been omitted from the Irish list by subsequent writers.

Cork.

COLEOPTERA AT KILLARNEY.

BY OLIVER E. JANSON, F.E.S.

ON the occasion of a first visit to Ireland in July, 1913, the greater part of the three weeks at my disposal was spent on the sea and in touring the very beautiful country around Glengariff, Bantry, Gougane Barra Lake, and Kenmare, but on arriving at Killarney, and meeting my friend, Mr. L. H. Bonaparte-Wyse, the stimulating influence of a fellow entomologist aroused my enthusiasm for beetle-hunting, and I devoted nearly the whole of the time of our sojourn there, from the 18th to the 25th of July, to collecting. At his suggestion I endeavoured to obtain as many species as possible with a view of adding records to the "Irish List."

Nearly all my collecting was done in the "Kenmare Demesne," a rather extensive, well-wooded, and somewhat wild, park-like enclosure, extending from the border of the town to the eastern shore of the Lower Lake, to which access may be obtained by anyone upon the payment of a small fee. Although a generally admitted unfavourable year for insects, and some six weeks late for the best season for Coleoptera, I was certainly disappointed with the rather meagre results of my week's work. In places near the lake shore where a variety of aquatic plants grew, and great masses of Meadow-sweet and Loose-strife were in full bloom, and with bright sunshine, an hour's sweeping

and beating would often produce less than half-a-dozen beetles beyond the ubiquitous *Rhagonycha fulva*, *Telephorus flavilabis*, and *Anthobium ophthalmicum*, these and *Anchomenus albipes*, being the only species met with in abundance. The total result of my week's work was only one hundred and sixteen species, about three-fourths of these being common things of general distribution and insufficient interest to record. I find my captures include eight additions to the fauna of Ireland as given in Messrs. Johnson and Halbert's very admirable "List of the Beetles of Ireland."¹

HYDRAENA LONGIOR, Rey.—Not uncommon on the under surface of fragments of rock in the Lower Lake. This species has been recorded by Mr. F. Balfour Browne.²

HOMALOTA NIGRICORNIS, Thoms.—One specimen taken by sweeping on Innisfallen.

H. INTERMEDIA, Grav.—Several examples shaken from decaying vegetable matter on the lake shore, Kenmare Demesne.

H. SUBTILIS, Scrib.—One specimen taken by evening sweeping in the Kenmare Demesne. This was the only addition I made to my collection.

PTENIDIUM PUSILLUM, Gyll.	{	A few specimens taken together in a damp, decaying tree stump, Kenmare Demesne.
P. LAEVIGATUM, Gillm.		

CYPHON PALLIDULUS, Bohm.—Swept in some numbers near Ross Castle and other parts. Apparently common in the Killarney district. It has been already recorded from Glencar by my friend, Mr. Donisthorpe, in his account of the Coleoptera of South Kerry.³

Besides the foregoing, I took, in the Kenmare Demesne, a specimen of a *Meligethes* unknown to me, and not agreeing precisely with any of the described European species; it most nearly resembles *M. erythropus*. As I devoted most attention to the smaller things this may probably account for the rather large proportion of new records

¹ *Proc., R. I. Acad.* vol. xxiii., 1902. ² *Irish Nat.*, vol. xxi., 1912.

³ *Irish Naturalist*, vol. xii., 1903.

for the Irish fauna. Of species not recorded from County Kerry in the "Irish List," I met with the following nineteen :—*Hydraena gracilis*, in company with this *H. longior*, before mentioned ; *Callicerus obscurus*, *Homalota elongatula*, *Stenus canaliculatus*, *S. declaratus*, and *Trichopteryx intermedia* (*lata* Matth.) under vegetable matter on the margin of the Lower Lake ; *Homalium punctipenne* and *Rhizophagus dispar* under bark of fallen Firs ; *Bolitophagus pygmaeus*, *Ptenidium nitidum* and *Melanotus rufipes* in decaying tree stumps ; *Stilicus similis*, *Atomaria basalis*, *Helodes marginata*, *Chrysomela hyperici*, *Centhorrhynchus litura* and *Phytobius comari* by general sweeping, all in the Kenmare Demesne ; and *Thanasimus formicarius* in old Hollies on Innisfallen. Some other species met with, that it may be of interest to mention were *Phlococharis subtilissima* in some numbers beneath the bark of dead Firs ; *Hydrocyphon deflexicollis* sweeping near the Queen's cottage on the Upper Lake, and *Rhopalomesites Tardyi* common, and varying greatly in size, in the old Hollies on Innisfallen, and also in partially decayed Beech trees in the Kenmare Demesne.

We were fortunate in having fine weather nearly the whole of the time, and although beetles were scarce and required hard working for, so that I obtained only a single species new to my collection, I far from regret my initial visit to the South of Ireland. The ever changing and charming scenery on the so-called "Tourist's Route" from Macroom to Killarney *via* Kenmare and Parknasilla, now made easily accessible by the well-arranged service of commodious motor coaches, and accomplished in two days if necessary, is, I consider, well worth a visit.

I must acknowledge with thanks the assistance given me in the determination of the Homalotae by Dr. M. Cameron and the Hydraenae and Trichopterygidae by Mr. E. A. Newbery.

Claremont Road, Highgate, London, N.

THE NATURAL HISTORY OF PLANARIANS.

BY R. H. WHITEHOUSE, M.SC.

(Read before the Belfast Natural History and Philosophical Society,
December 9th, 1913.)

THERE are three classes of flat-worms, known respectively as Turbellaria, Trematodes, and Cestodes; the first of these have not even attracted the attention of the public sufficiently to have given rise to a popular name; the second class are popularly called "Flukes," and one or two of the best known give rise to "liver rot" in sheep; the third class are called "Tape-worms," and are best known as parasites in domesticated animals. In this paper it is proposed to deal with the Turbellaria—so-called on account of the disturbances they produce in the water in which they live; such disturbances, however, are of course exceedingly slight. There are three groups of Turbellaria, viz., Rhabdocoeles, which are aquatic or semi-aquatic; Triclad, comprising both aquatic and terrestrial forms; and Polyclads, which are marine organisms. The Triclad are divided into sub-groups according to their habitat, viz., Freshwater (Paludicola), Marine (Maricola) and Land Planarians (Terricola); of the freshwater planarians four species can be readily obtained in the Belfast district, though there are doubtless others too. Several marine forms are found on the shores of Belfast Lough, and Land Planarians are represented by *Rhynchodemus terrestris*, which is very common.¹ Land Planarians, however, have their home in the tropics.

The interest and importance of these lowly organised worms have not been overlooked by men outside the ranks of academic zoologists; this is evident from the remarks of Professor J. A. Thomson in his presidential address to the Royal Physical Society of Edinburgh in 1912, on "Professor Bergson's Biology." He says: "With clear

¹ For localities and figures, see R. F. Scharff, *Irish Nat.*, vol. ix., 1900, pp. 216-17.

insight Bergson recognizes the extraordinary interest that attaches to the early worms—almost the first creatures to have bilateral symmetry, and the first to have head-brains, beginning the long process which has enabled us to tell our right hand from our left. He gives them their due, those early worms—‘infinitely plastic forms, pregnant with an unlimited future, the common stock of Echinoderms, Molluscs, Arthropods, and Vertebrates.’”

Planarians do not make themselves specially evident, and in searching for them it is necessary to examine the under surfaces of stones, or leaves and stems of weeds in ponds; the shaded situations between the leaves and stems of such submerged plants as flags and rushes are sure places to find them. Nevertheless, planarians make frequent excursions to the bottom mud, over which they glide in search of food. They vary in size, but are never very large; a specimen one and a half inches in length would, indeed, be a large one, and many do not exceed one-third of an inch, at least when at rest. Land planarians are also lovers of the shade, and live either on the damp humus of the ground, or on the under surface of old stumps, or between the leaves and stem of certain plants. They vary much in size, small ones being less than an inch in length, while the large ones, found principally in the tropics, may measure eight or nine inches or more. Marine planarians closely resemble their freshwater relatives, and are in all essentials similar to them.

On the general form of planarians nothing beyond the fact that they are as a rule flat and band-like need be said; but something must be said of their colour. As a rule, freshwater forms are fairly evenly coloured, though mottled and striped examples are known. The commonest freshwater planarian in the Belfast district is a small dark grey or black creature called *Polycelis nigra*, about three-tenths of an inch in length when fully extended, and about one-tenth when at rest; brown forms are common enough, and belong, I believe, to the species *Planaria lugubris*; *Dendrocoelum lacteum* is a beautiful milky-white creature, transparent enough to show the dendritic gut through

the general body tissues ; this species is indeed a giant among the freshwater planarians, specimens often measuring over an inch ; another species common in the streams on Cave Hill is *Planaria alpina*, a small animal with lappets at the sides of the head ; it is found in large numbers on the under side of stones soon after the stream issues from the chalk. Beauty of colour is at its height among the tropical land planarians ; selections from black, white, purple, blue, green, yellow, red, etc., are productive of exquisitely beautiful forms. The commonest arrangement is the stripe, either longitudinally along the animal or cross-wise ; sometimes marbled or speckled patterns are shown, while others are unicoloured. Almost invariably the under surface is paler than the upper, probably because the varied colouring of the upper surface is not needed on the parts not exposed to the passers-by. The brilliant colouration of land-planarians must be looked upon as a warning to animals likely to prey upon worms ; from experiments with birds they have been shown to be distinctly distasteful, and Prof. Dendy tells us that he has himself tasted them, and found them very disagreeable !

The characteristic mode of movement among planarians is by means of short and indefinitely numerous hairlike processes called cilia. The planarian does not come into actual contact with the surface over which it glides, but lays down a mucus, just as a snail does, and it is on the smooth surface of its own mucus or slime that it moves ; the slime is produced by glands distributed all over the lower surface, particularly at the edges. Except for the head itself, the whole of the lower surface is in contact with the slime-covered substratum as the animal moves. The uninitiated person nearly always refers to planarians as leeches, but this mistake would never be made if the method of locomotion were observed ; a leech moves by looping with the aid of a sucker at each end of the body ; a planarian glides.

The planarian holds its head up in the world ; the anterior end is always slightly raised and waved from side to side ; at the same time the exceedingly mobile and

sensitive fringe of the head maintains a continuous wave-like motion, specially noticeable where what we may call "ears" are present at the sides of the head. Occasionally, the animal will stop, raise the whole front end of the body and wave about gracefully in the water. Such movements are called testing movements and are specially to be observed under certain conditions; *e.g.*, before coming to rest, the creature "tests" the surroundings before it relaxes its muscles and settles down; after resting, it "tests" the neighbourhood before resuming progression; all obstacles are "tested" to determine the nature of the impediment, if it is food it is appropriated, if not it is avoided; if a bright beam of light is suddenly thrown on the front end of the animal, it "tests" it before turning aside; and so on.

As soon as an aquatic planarian appreciates any signs of drying, it first "tests" the drop of water it is in, then curls up in such a way as to expose as little as possible of its surface, particularly protecting its sensitive head. If the drying is continued, it tries to "back out" exactly as it would if it were on the edge of a pond where evaporation was going on rapidly.

Similar testing operations are exhibited when the water in which a planarian is placed is heated gradually. When the vessel is heated from one end, the animal goes to investigate the cause of the change taking place and proceeds towards the source of heat; without imperilling his safety, he discovers the locality which is "too hot" for him and retires to cooler quarters. As the heat increases he becomes more and more disturbed and finally plunges about wildly in every direction to avoid the danger—not, however, until all reasonable testing movements have been tried in vain. An important thing to grasp is that a planarian moves *towards* all weak stimuli and "tests" them; in truth it has been said, the planarian "proves all things, holding fast only to that which is good."

Accidents are likely to happen even in the planarian world and for some unavoidable reason the flat-worm may come to be on his back. In such a position the animal

shews the same desire as that of the majority of animals to get right side up, and that quickly; the creature twists itself, front end first, so as to bring the under side of the front end of the body next the surface on which it is moving; it then proceeds forwards, gradually bringing more and more of the under surface in its normal position.

The amateur experimentalist is frequently disappointed after repeating such apparently simple experiments and finds that all animals of the same species do not behave similarly when subjected to the same stimuli, and consequently he discredits the professional worker. But such experiments are by no means simple; similar animals will only react similarly if they are in a similar physiological state; the simplest way of illustrating this is by watching the hungry and the satisfied worm deal with food; the former will greedily devour even poor quality while the latter may refuse a tit-bit. The determination of the physiological state of a worm is not a simple matter.

In the same connexion the history of the individual is an important determinant of a creature's behaviour towards stimuli; in other words, past experience has an important bearing on an animal's attitude towards things around it. Says Bergson, "the present moment of a living body does not find its explanation in the moment immediately before; *all* the past of the organism must be added to that moment, its heredity—in fact the whole of a very long history." Let us take an illustration. *Planaria alpina* is found in swiftly-flowing streams; the animals are always found attached to the under surface of stones lying at the bottom; I have never found them on wood, even if it be firmly fixed in the gravel or wedged between stones. Past experience has no doubt taught this planarian that wooden things are liable to subject it to considerable buffeting, while stones at any rate are more to be relied on for an undisturbed existence.

Again, if *Planaria alpina* and *Polycelis nigra* (both fresh-water planarians) be placed in an aquarium, the former never, while the latter frequently glides along the under surface of the surface film of the water. The reason is

that *Polycelis nigra* inhabits the placid waters of ponds, where a glide along the surface can be enjoyed, and floating particles of food found. The former lives in rapid streams, where there is not even a sporting chance of the surface film remaining sufficiently intact for any length of time to allow an excursion upon it. Thus, the habits of animals are largely moulded on past experience. Pearl, a well-known worker on this subject, says you must know your planarian as you know a person, intimately, before you can safely dogmatize on its behaviour.

I do not intend dealing with details of anatomy, but among other peculiarities of this group of animals the position of the mouth can be regarded as a feature of popular interest. This aperture lies about half-way along the body on the under surface; it does not lead directly to the food channel, but into a cavity in which hangs the tubular beginning of the gut like a bell. This tubular structure is capable of considerable extension, and can be protruded far out of the mouth, trunkwise, ready to secure any morsel of food that is about; after seizing the food, this pharynx is retracted through the mouth. A drowned earthworm is a much appreciated find for *Polycelis cornuta*, and numbers of these planarians may be seen enjoying such a feast. The white protruded pharynx is often to be seen in the small black form so common in this district (*Polycelis nigra*).

Except as regards the eyes, the sense organs of planarians are puzzling structures, and may be omitted here. The eyes, however, vary in number from none to thousands within the Triclad group; when present in large numbers, as in many land planarians, they appear as small dots along the front and sides of the head, along the sides of the neck, and even for a considerable distance along the sides of the body. They can scarcely be regarded as more than light perceivers—a real image is not formed by them. Of the four common local species mentioned, three have two eyes which are rather highly organized, and one (*Polycelis*) has about a score or more arranged round the front end and for a short distance along the sides of the body in a single row.

I would bring this paper to a conclusion by a very brief reference to that subject so extensively advanced in recent years by American workers from studies on planarians; I refer to the subject of regeneration. Planarians reproduce their kind exactly as do other animals by means of the fertilized egg; however, they may adopt another method, common enough it is true, known as spontaneous division. It may occur by accident or by the deliberate action of the worm itself; but whatever the cause, the animal merely becomes cleft in two, and each part builds up the missing portion, two perfect animals resulting. Such a method is quite normal; in fact some species lay eggs in winter and continue reproduction during summer by constricting and freeing portions of the body. Sometimes the weirdest forms result from this method of reproduction and from regeneration, which suggest that the animal had changed its mind during the process; we find wiseacres with two heads, and some people may be surprised that Natural Selection did not perpetuate creatures endowed with such a double share of intelligence! Double-tailed forms are common enough—often the result of an accident. A particularly interesting form with two pharynges and two mouths is occasionally met with, and we can imagine no more self-satisfied creature.

Queen's University, Belfast.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Macaque Monkey from Dr. Kingsley O'Sullivan, a Marmoset from Mr. Bartlett, four Rabbits from Mr. J. J. Foley, two Peacocks from Mr. R. G. Nash, a Blue-fronted Amazon Parrot from Mr. J. P. Watson, and a number of Frogs and Toads from Prof. J. Bayley Butler. A Brown Capuchin Monkey, a Grey Parrot, a Sulphur-crested Cockatoo, a Black-headed Conure, and a pair of Yellow-hammers have been bought. A young Wombat has been born in the Gardens.

Many thousands of Salmon and Trout eggs have been received from the Irish Fisheries Office, and are now undergoing development in the Hatchery near the Upper Pond.

DUBLIN MICROSCOPICAL CLUB.

NOVEMBER 12.—The Club met at Leinster House, J. H. WOODWORTH (President) in the chair.

T. R. HEWITT showed the recently discovered first-stage larva of the large Ox Warble-Fly (*Hypoderma bovis*), newly hatched from the egg. The larva, less than imm. in length resembles an ordinary muscoid maggot in form, the tapering head region being armed with powerful mouth-hooks and a sharp central spine directed forwards. The body-segments have rows of numerous strong spines forming a relatively formidable armature, especially prominent at the broad hinder end.

R. SOUTHERN exhibited specimens of the fresh-water Leech, *Hemiclepsis marginata* (O. F. Müller), recently added to the Irish fauna, and recorded amongst the Leeches found in connection with the Survey of Clare Island. Three specimens were found in Garraunbaun Lough, a small lake near Ballynakill Harbour, by Mr. G. P. Farran. The species seems to be rare in the British Isles, though it is widely distributed in Europe. It is characterised by the possession of two pairs of eyes and seven longitudinal rows of yellow spots on the dorsum.

J. N. HALBERT exhibited the nymph stage of an Oribatid mite, *Tegeocranus latus*, to illustrate the great difference which exists between the adult and young forms. The nymph of this species is very curious on account of the great forked chitinous processes, and the serrate hairs, with which the body is ornamented. It was found in company with the fully-developed mite under the bark of decayed fir trees on Achill Island.

W. F. GUNN exhibited seeds of the flowering shrub, *Buddleia variabilis*, side by side with the fresh-water Alga, *Hydrodictyon utriculatum* (the water net), in order to draw attention to the resemblance between them. Both objects may be described as cylindrical nets tapering towards the ends, with a solid portion enclosed in the centre. The one, of course, has no relation whatever to the other, but the close superficial resemblance of two objects so utterly unrelated is very striking.

DECEMBER 10.—The Club met at Leinster House, the President (J. H. WOODWORTH) in the Chair.

Dr. G. H. PETHYBRIDGE exhibited seeds of Celery with the pycnidia of the Celery leaf-spot fungus *Septoria petroselinii* var. *apii* on them. The celery leaf-spot disease was first recorded in Ireland by him in 1906, and during recent years it has spread to a great extent through the country, mainly, it is believed, owing to the use of affected seed. A recent examination of samples of celery seed on sale in Ireland showed that over 78 per cent. of them carried the disease. He also showed the same fungus on the leaves of the Wild Celery, on which it has not been found previously in the British Islands. The Celery plants in question were growing by the sea in the extreme west of Co. Galway, some eight or ten miles from Clifden. There was every appearance of the plant being native in this spot, although the Wild Celery has not apparently been previously recorded for West Galway. It seems highly improbable that the fungus could have spread to wild plants from cultivated ones.

Prof. G. H. CARPENTER showed a species of Eosentomon, one of the genera of Protura, an order recently founded by Prof. Silvestri, of Naples, for the reception of some wingless insects probably allied to the Collembola and Thysanura. Several forms of these interesting creatures have been found in Great Britain, but they have not yet been observed in Ireland. The specimens shown were due to the kindness of Mr. C. B. Williams, of Merton, Surrey, who has lately published a useful summary of our knowledge of the Protura (*Entomologist*, 1913).

D. M'ARDLE showed the leaves of *Orthotrichum Lyellii* from the margins of which protruded numerous brown septate gemmae, some of which were forked or branched; these were known to the old bryologists as "Conferva Orthotrichi," and they resemble some of the Conferva such as *Stigonema minuta* and others. Recent researches prove them to be adventitious protonema, and simply the asexual mode of reproduction in a moss which is rarely found in fruit on account of its dioecious character. The specimens were collected recently in the Co. Wicklow, at an elevation of more than 1,000 feet, growing on the bark of Oak trees. The exhibit under a high power showed the early stage of cell-division; the cells are mostly bi-nucleated, and growth takes place outwards from the margin of the leaves into broad tubes which become septate as they grow. A further stage was shown where the gemmae were more matured, some of them forked in the first stage of branching, and highly coloured; these, under favourable conditions, would produce young plants with leafy stems, which in their turn might bear either male or female fruit, or revert again to the asexual mode, and so carry on the life-history. Two excellent micro-photographs were shown of the specimens exhibited, taken by Mr. Gunn, and mounted specimens of the moss to show the growth of the plant. Though evenly distributed in this country, it is rarely found in fruit; once it has been seen in that state at Westaston, Co. Wicklow. It is also found in Great Britain, Germany, and North America; curious to relate the American plants are almost always without the remarkable protonemoid gemmae so characteristic in British and Irish plants.

NOTES.

BOTANY.

Leptoglossum robustum, an American fungus new to Europe.

On December 14, on the top of Montpelier Hill, Co. Dublin, a few hundred yards south of the ruined shooting-lodge (1,200 feet elevation), I found several patches of a *Geoglossum*, which in its shape, robust tufted habit, and brown colour looked unfamiliar. I sent the plant to Mr. A. D. Cotton, of Kew, who replies:—"It is *Leptoglossum robustum* Sacc. (= *Corynetes robustus*, Durand) described by Durand in 1908 from several localities in U.S.A. It differs from *L. atropurpureum* in its more robust

caespitose habit, larger spores, and absence of an epithecium. It is an addition to the flora of the British Isles, and has not as far as I know been recorded for Europe. Durand made a very thorough study of the Geoglossaceae, mastering first the specimens in European herbaria, and then collecting diligently in his own country, where he discovered several new things. We found *Microglossum arenosum* in Scotland last year (first British record) and doubtless other species would turn up if they were properly searched for. They are rather late in appearing, and all look much alike externally. I give you Saccardo's name, not because I disapprove of Durand's classification, but because it is in agreement with that customary in Europe."

Dublin.

R. LLOYD PRAEGER.

ZOOLOGY.

***Spilocryptus fumipennis* in Co. Donegal.**

I wrote to Mr. G. Meade Waldo of the British Museum, asking for information about a cocoon, found on the mountains not far from here, which contained within itself other cocoons and the remains of an unfortunate caterpillar of the "Emperor" Moth (*Saturnia pavonia*). Mr. Waldo informs me that the small cocoons are those of the ichneumon fly *Spilocryptus fumipennis*, Grav., whose larvae feed within the caterpillar "after the custom of all such parasites, avoiding the vitals of the host. In this way a number of the ichneumon larvae can live in the the large 'Emperor' caterpillar without killing it until it has completed its cocoon, only putting an end to its existence when they are ready to spin cocoons and pupate themselves."

Coxtown, Bridgetown, Co. Donegal.

GERTRUDE TURNER.

***Catoptria aspidiscana* Hb., at Ardrahan, Co. Galway.**

This Tortrix has been added to the list of Irish Moths by Mr. Jas. W. Corder, of Ambleside, who writes to me that he took a fine pair of this very local and usually scarce moth at Ardrahan on the 31st May last year. The specimens were subsequently compared with a series in Mr. John Gardner's collection at Hartlepool, and identified without doubt.

Drumreask, Monaghan.

WM. F. DE VISMES KANE.

Wanderings of a Black-headed Gull.

A Black-headed Gull (*Larus ridibundus*) was captured about December 28th, 1913, by a ploughman on an adjoining farm. It was ringed on May 17th at Ravenglass, Cumberland, as a nestling with one of Mr. Witherby's rings—No. 28686.

Fassaroe, Bray.

R. M. BARRINGTON.

Waxwing in Co. Tyrone.

Mr. Henry Wilson sent me a Waxwing, *Ampelis garrulus*, shot on Christmas Day (1913) at Stuart Hall, Co. Tyrone. The bird, which on dissection proved to be a male, weighed exactly 2 ounces. This is the first recorded instance of this species having been observed in Co. Tyrone.

Hillsborough, Co. Down.

NEVIN H. FOSTER.

REVIEWS.

INSECT TRANSFORMATIONS.

The Life-story of Insects, By GEO. H. CARPENTER. Pp. 134, with illustrations. Cambridge: University Press, 1910. Price 1s. net.

This little book is one of the most recent of the excellent series of popular Cambridge Manuals of which no fewer than eighty volumes have already appeared. Professor Carpenter must have had a most difficult task in compressing the essential points of so vast a subject within the limits of a book of this size. It is evident that his practical experience of the problems of insect life has not failed him in the successful accomplishment of the task. In nine clearly written chapters, the author reviews the life-histories of the various orders of insects, with special reference to their wonderful transformations. In the chapter "From Water to Air," there is an excellent and well-illustrated account of the changes in the life of a typical dragon-fly, and the chapters dealing with larvae and pupae of metabolic insects are also of great interest.

The weird question as to whether we should regard the larval stage in the higher insect groups as an indication of the worm-like nature of their ancestors, or as an evidence of divergent evolution, is treated at some length. The author believes, with the majority of students, that "whatever differences of opinion may prevail on points of detail, the general explanation of insect metamorphosis as the result of divergent evolution in the two active stages of the life-story must assuredly be accepted."

In connection with the development of the insect wing, we should prefer the use of the word "ingrowth" to "inpushing" where invagination is understood. Another small point is that the use of English names for the various leg-segments is scarcely an improvement on the generally accepted Latin terms. We have failed to find a single misprint in the book, which is printed in the clear type of the series, and is excellently illustrated. Some of these drawings originally appeared in Professor Carpenter's useful economic reports on Irish insect pests.

J. N. H.

A HISTORY OF SHELLFISH.

The Life of the Mollusca: By B. B. WOODWARD. Pp. 158, with illustrations. London: Methuen & Co., 1913. Price 6s.

"This volume gives a popular but accurate summary of what is known concerning the ways, habits, and mode of life of this branch of the Animal Kingdom, of which the snail, the oyster, and the cuttlefish are familiar examples." Thus reads the inscription on the cover of Mr. Woodward's book, and our expectations are not disappointed on its perusal. The Mollusks, which comprise upward of 50,000 living species, are of such economic value, we are brought into contact with them in so many ways, and they possess such varied attributes, that a work like Mr. Woodward's is sure to attract a good deal of public attention. When we read of one kind of Mollusk possessing 750,000 teeth, that another lays at one time one hundred million eggs, while some have thousands of eyes scattered over their bodies, one wonders how it is that these creatures have not made for themselves a greater reputation, and have not gained a more important position in the Animal Kingdom. The subject discussed by Mr. Woodward is a fascinating one. He has done his best to make himself understood by the ordinary reader, and yet certain chapters, such as those on Classification and Reproduction, might perhaps have been written in a lighter strain. The chapter on Evolution is an excellent piece of work, with which no fault could be found. A few remarks will probably fail to enlighten the ordinary reader, for instance (p. 13) that the Chaetopoda, Gephyrea, Rotifera, Bryozoa, and Brachiopoda belong to the same division of the Animal Kingdom as the Mollusca, while his description of the organs of defence among the Aeolididae (p. 123) is apt to give the impression that these Mollusks are actually furnished with formidable stinging cells of the type of those found in the jelly-fishes. As a matter of fact the stinging cells in those sea-slugs seem to be merely derived from the jelly-fish on which they feed, and they form no part of the molluscan anatomy. Under the heading of "Uses" of Mollusks, Mr. Woodward quotes (p. 144) a few prices given for rare shells, and remarks that of late years the highest sum spent on a single shell was £55, paid by the British Museum for a *Pleurotomaria*. He fails to tell us that this was quite a cheap bargain for the British Museum. The same species has fetched £175 in Berlin, while a good *Conus gloriamaris* realised £75 in Germany. Mr. Woodward's little book is free from misprints, and has an excellent index. It is a thoroughly trustworthy work, and most of it is easily understood by those unacquainted with the subject, so that there need be no hesitation in recommending it to all who require a good elementary treatise.

R. F. S.

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FIELD NOTES ON THE FOLK-LORE OF
IRISH PLANTS AND ANIMALS.

BY NATHANIEL COLGAN, M.R.I.A.

(Read before the Dublin Naturalists' Field Club, 11th February, 1913.)

Many of the papers read before this Club have been open to the objection of being so solid or technical as to make but a feeble appeal to a large section of the members, who have never specialised in any particular branch of natural history. The present disjointed notes are intended to serve as a corrective. They will appeal, I hope, to even the most unscientific members, and will point out to them a line of research in which all can display their activity. The plant and animal lore of the peasant if studied in the field will be found to be of absorbing interest. Folk-lore, no doubt, may be sneered at by a critic who adopts the utilitarian standard; but that is a standard which will never be accepted by this Club if I rightly understand its sentiments, and I would go farther and say that many of us will find in the very uselessness of this branch of knowledge, one of its greatest attractions. If, again, the various lines of research which we follow in the pursuit of knowledge for its own sake be classed in accordance with their difficulty and the amount and variety of the mental energies which their prosecution demands, then it may be easily shown that folk-lore by no means takes a low place.

The notes I now proceed to give are almost altogether original in the sense that all of them have been jotted down in the field, and but few of them have been published. In my various tramps and scrambles in the Irish highlands I have never let slip an opportunity of "drawing" any likely subject I came across in the glens and on the hill-sides; and by adopting an attitude of earnest discipleship, by sitting at the feet of the wise men who condescended to instruct my ignorance, I have succeeded in gleaning many curious fragments of folk-lore. It is refreshing to enter in this way into minds stored with unwritten wisdom and unwisdom, links in a long chain of oral tradition binding together distant ages and diverse races of men.

PLANT LORE.

To come to the immediate subject of these notes, and dealing first of all with plants, much of the material may be conveniently arranged so as to illustrate two beliefs or doctrines which appear to be widely prevalent in Ireland. The first may be called the doctrine of TRANSMOGRIFICATION OF SPECIES, the second the doctrine of SEXES IN PLANTS, a doctrine far older than and utterly distinct from the Sexual System of Linnaeus.

In accordance with the Transmogrification Doctrine, which anticipates and in audacity far surpasses the Mutation or Discontinuous Variation theory of De Vries, a species is held to have an innate capacity, within the life-time of a single individual, of producing another species belonging to a distinct genus or even to a distinct Order or Class. The new species is usually held, and not unjustly, to be the old species gone wild. For instance, at Feenone between Louisburgh and the Killary, in 1911, a man pointed me out the Royal Fern, and said, "We call them Wild Rannyocks," the Rannyock proper, the sane and steady Rannyock, being here, as everywhere in Gaelic Ireland, the Common Bracken. Again, in Clare Island, Sparganium or the Bur-Reed is held to be Wild Shellstring or Flagger. A countryman near Kilbarrick, Co. Dublin, once assured me that the common *Centaurea nigra* or Blackhead grew out of the Plaintain or Ribwort, and, to cap these instances, a farmer near Cocles Bridge at Garristown was quite positive that a flowering plant of Angelica which I pointed out to him in a ditch had originated in the Flaggers or Yellow Iris that grew alongside.—"Sometimes" he said, "them Flaggers blossom out that-a-way; more times they don't. Wild Flaggers they call them." This last informant, who was quite enthusiastic about plants, I came across, or rather he followed me to see what I was at, as I sought in vain for *Rumex maritimus* which once grew along the slow stream or deep channel by which the old Garristown Bog was drained. I was long puzzled by the name "Cocles Bridge" cut on a slab of the parapet of

the bridge which spans this stream, suggesting as it did Horatius who kept the bridge in Macaulay's Lay. I was inclined on the whole to set it down as a joke of the County Surveyor until I discovered that Coghill is a well-known form of eel-trap or net often mentioned in Fishery Reports. The bridge, no doubt, takes its name from the vicinity of a favourite station for these Coghill or eel-traps.

My first acquaintance with the peculiar SEXUAL SYSTEM in plants, which finds credence all over Ireland, was made in 1901, when botanizing and hunting for Gaelic plant-names on Carlingford Mountain, above Omeath. Here I was told of a *He-Slanlus* and a *She-Slanlus*, but unfortunately had no time to procure samples of the two sexes. *Slán lúp*, I need hardly say, perhaps, is the name current almost throughout Ireland for the Common Ribwort or Plantain.

Four years later, while driving from Skerries to the Man-of-War, I came on the track of a He- and She-Bulkishawn, or Ragweed. My informant was the car driver. The She-Bulkishawn, he told me, was an ingredient in a famous horse medicine, which appeared to be quite as potent as Don Quixote's Balsam of Fierabras, and far more complex in its constitution. No less than twelve "erribs" went to the brewing of this medicine. There was Garlic and Fetherfew, and Yarrow and Broom, and He-Bulkishawn and She-Bulkishawn, and six other "erribs," he disremembered the names, but the She-Bulkishawn was the best of them. He wouldn't say himself that all the twelve "erribs" were indispensable, but I gathered from him that not even the most advanced thinkers would venture to omit any of them. "What is the She-Bulkishawn like?" I inquired. "Oh," he answered, "it's something like the He-Bulkishawn, the Ragweed that grows everywhere, but it hasn't any flowers and it's a sight harder to find." He was instructed to keep a sharp look-out for her, and, finally, as we approached Balrothery, he stood up and, pointing eagerly with his whip to a tuft of the Common Tansy growing on a roadside bank near a field gate, cried out—"There she is!"

In Clare Island, in 1910, I made the acquaintance of a He- and She-Arctium, or Burdock, a *Cráobán píreann* and a *Cráobán binnean*. But these two sexes were not assigned to plants of different genera, as in the case of the *Dalcaireán*, but to different states of the same plant, the *Cráobán píreann* being the fruiting plant, the *C. binnean* the plant with large base-leaves before the fruiting stem has shot up. There was a cure in this plant, but it was only found in the *Cráobán binnean*. Next year, on the opposite mainland, at Carrowmore and Bunowen, I again came on the He- and She-Crawdawn, and farther on along the coast, at Roonah, encountered a He- and She-Nyanthoge, or Nettle, a *Neantóg píreann* and a *n. binnean*. I failed to get specimens of the two Nyanthoges, but was told that the She-Nyanthoge was a kind plant, while the He was a coarse, stinging one.

All endeavours to arrive at any fixed principle underlying this sexual system are as fruitless as endeavours have hitherto been to find an absolute standard of human conduct. This much alone is certain, that in the folk botany of Ireland a male and female element is recognised, as in all systems of morality there is a recognition of a right and wrong. This folk idea of a sexual system in plants is obviously no echo of modern scientific doctrine. It is, no doubt, the outcome of a primitive analogical instinct which has urged man in all ages to expect to find and to seek for in the plant world distinctions parallel to those which daily impress themselves upon him in the animal world. The working of this instinct may be traced far back in human history; and we still have with us a few survivals in such names as Male Pimpernel and Male Fern. For us, however, these are but petrifications of thought and language. The spirit is gone from them, while the names given by the Gaelic peasant to his male and female plants are the expression of a living belief.

THE ELDER, OR BORE TREE.—In Gaelic Ireland this is usually known as the Trom or Tromaun, but in some parts of the west and in the north the name common in the Scotch lowlands and in the northern counties of England, variously

pronounced Bo-three, Bore Tree, or Bottry, is used. In East Ireland, Elder is the name generally used. The reputation of this tree or shrub is uncertain. Though credited with an extraordinary number and variety of medical virtues, including the cure of rheumatism by merely carrying on the person a branch of the tree, it has in many places an evil repute and is said to be the tree on which Judas hanged himself. The grimmest belief associated with the tree is one I met with in Co. Dublin, near Baldongan. I was driving here one day with the carman who introduced me to the She-Bulkishawn, when we passed a clump of Elder in a hedge. "What do you call that tree?" I asked him. "Oh, that's the Elder Tuff," he answered. "It's a bad thing to give a man a scelp of that. If you do, his hand'll grow out of his grave."

THE HOUSE LEEK.—We are all familiar with the appearance of this plant on cottage roofs, and with the belief that it preserves the house from lightning and fire. This belief is an old one. Sir Thomas Browne mentions it in his *Garden of Cyrus*, published in 1658. How to secure the full benefit of the plant is not sufficiently well known. It was in 1897, when botanizing in Glen Inagh, in Connemara, where the plant is known as *buacail a tige*, or the Boy of the House, that I first learnt how to make use of the plant. I was told that it had no effect at all in protecting a house unless it had been stolen from the previous owner, or, at all events, taken without his knowledge. If you were made a present of the plant it wasn't a bit of good.

ANIMAL LORE.

Passing from these random notes on the folk-lore of plants, I come to the second division, that dealing with animals. My examples are taken chiefly from marine zoology, and the first, the Common Star-fish, *Uraster rubens* of science, suggests an interesting linguistic problem. On the Dublin coast at Skerries this species is commonly known by the Gaelic name *Cporán*, while some twenty miles south, at Dalkey, in the same county it is known as the *Cporóg*. Why is the affix or termination *an* changed

into *og* as one passes south? The phenomenon is not an isolated one. It recurs again at Clare Island, where the Common Periwinkle is known as the *ṽṽṽṽṽ*, while on the opposite coast, at Achill Sound, some four miles distant, it becomes the *ṽṽṽṽṽ*. Similarly, among plants the Bilberry, known as *ṽṽṽṽṽ* in Dublin and Kerry, takes on the name *ṽṽṽṽṽ* in Mayo. This is a problem I must leave to Gaelic scholars to solve.

We are all of us familiar with the JELLY FISH, which in the summer months often swarm in our inshore waters and from time to time are found stranded on our beaches. When dredging off Rush one day, some five or six years ago, a large specimen of the species *Rhizostoma pulmo* went wobbling past our boat. "What do you call that?" I asked the boatman. "Oh, that's the Sun Jelly. We call them Swalders." At Howth, again, I found the same name "Swalders" in use among the fishermen, while at Kings-town it became altered and shortened to Squalls, very large specimens being called "Parliament Men," why I could not discover, and can only surmise that it was suggested by their invertebrate inconsistency. Now the name Swalders is an old East English name for the Jelly-fish, which has been somehow imported into East Ireland. Sir Thomas Browne used it some 250 years ago in a slightly altered form in the following passage:—" *Stellae marinae*, or Sea Stars, in great plenty about Yarmouth. Whether it be bred out of the Urticus, Squalders, or Sea Jellies, as many report, we cannot affirm; but the Squalders in the middle seem to have some lines or first draughts not unlike."

The true BARNACLE, *Lepas anatifera*, is occasionally cast up on our shores. In September, 1911, while exploring the coast from Roonah towards the Killary, I came across a fine bunch stranded near Roonah Lake. Two countrymen who happened to be close by gathering seaweed gave me the native name as *ṽṽṽṽṽ*. I was unable, however, to draw from them any views as to the nature of the animal. We all know the old belief associated with this pelagic cirripede and preserved in its specific name, the belief that it gives birth to the Barnacle Goose. A very circumstantial

account of the metamorphosis is given by Giraldus Cambrensis in his famous 12th century "Topography of Ireland," where he tells us he has seen with his own eyes more than 1,000 embryos of birds of this species on the sea shore. He does not approve of bishops and men of religion eating these geese on fast days on the plea that their fishy origin takes them out of the category of flesh. Giraldus does not object on the ground that he holds the origin of these geese to be "fishy" in the modern slang sense of that term. He accepts the marine origin of the geese as fully proved, but maintains, nevertheless, that the geese are flesh.

On this same coast, beyond Roonah, where Inishturk, Caher and Clare Island open out so grandly across the great smooth rollers on a fine day, I found the boys had distinctive names for the Cormorant and the Shag, *Caitleac Dub* for the first and *Cperán* for the second, while the Common Limpet or *Patella* known here, as it is all round the Irish coasts, by the name *Daimeac*, was firmly believed to develop out of the Acorn-shell or *Balanus* which studs the rocks. The same opinion is held at Loughshinny, on the Dublin coast.

I have already claimed the attention of my hearers so long that I refrain from further reference to the folk-lore of Irish animals known to science, so that I may have a few minutes left to devote to some of our animals which still await scientific description and nomination. There is reason to believe that these enjoy no more than a subjective existence. The first of these subjective animals, as we may call them, is the CARRABUNCLE. It is an aquatic animal, and the first reference I can find to it is a rather vague one in Smith's *History of Kerry*, published in 1756. Speaking of the Killarney Lakes, Smith says:—"The common people here-about have a strange, romantic notion of their seeing in fair weather what they call a carbuncle at the bottom of the lake in a particular part of it which they say is more than 60 fathoms deep." Smith, erroneously as I believe, assumes this Carbuncle of the common people to be the precious stone so named, and in a footnote expresses doubt as to whether any such stone exists.

The next reference to the "carrabuncle" is found nearly 130 years later in Mr. Henry Hart's paper on the "Plants of some of the Mountain Ranges of Ireland," published in the R. I. Academy's Proceedings for 1884. He there tells us how a countryman who accompanied him on Brandon Mountain in 1883 told him that in Lough Veagh, one of the lakes under Brandon, the people get pearl shells. These come off an enormous animal called the "Carrabuncle" which is seen glittering like silver in the water at night. The animal has gold and jewels and precious stones and shells hanging on to it, and has never been caught. Hart hopes that sometime a specimen will reach our National Museum. (I am informed that it is still a desideratum in that fine collection of Irish animals.)

On a visit paid to Brandon five years later, in 1888, I had the good fortune to meet Hart's informant on the mountain side, and lost no time in "sounding" him on the subject of the Carrabuncle. He told me it was a kind of snake that lived in Lough Geal, not L. Veagh, and made the lake shine, and threw off shells with precious stones in them. He never saw the Carrabuncle, but if you could only catch it you would get some things of great value that follow after it. On returning that night to Cloghane, where we stayed in Connor's small publichouse and lived on eggs, griddle bread, and stewed cockles, Connor gave us further information about the Carrabuncle. He had never seen it himself, but had often heard tell of it. It was only seen once in seven years and was "like a cashk rowlin' about in the wather." Mrs. Connor always thought the carrabuncle was a fish, and she remembered men coming some years before and getting pearls in the lakes and rivers, "out of them shells called *breallacans*." The *Breallacán* is evidently *Unio margaritifera*. Dinneen gives the word in his Dictionary, and explains it as "a sort of oval shell-fish" without attempting to identify it. The next day the local postman confirmed the existence of the Carrabuncle. It lit up the whole lake, he said, and the pearls found in the river that flowed out from Lough Geal came off the Carrabuncle.

Lough Geal, or the Bright or White or Shining Lake, lies at 360 feet under the spurs of Brandon on one's left as one descends Connor Hill to Cloghane. You catch sight of it just as you pass on the right of the road the little Cum Cáoč, or Blind Glen, where lies the lonely tarn known as *lóc a pedlaré*, or the Pedlar's Lake, which takes its name from a pedlar who was murdered there many years ago. Lough Geal is connected with a higher lough, Lough Duff, and discharges by a stream which gathers all the waters from the grand central cirque of Brandon, including those of Lough Avoonane in Glanshanacuirp, before reaching the sea at Cloghane. By Glanshanacuirp, the Glen of the Old Dead Body, there hangs no doubt some tragic tale like the story of the Pedlar's Lake; but its memory had passed away from the Cloghane folk, and the origin of the name still remains for me a mystery.

To sum up, the Carrabuncle would seem to be a highly developed form of the *πιάρτ*, or great serpent or dragon, which inhabits, or at all events did inhabit in less sceptical times than ours, many of our Irish lakes, as their names suggest. There are at least two stations for the *πιάρτ* in Kerry, Loughnapiast, in the Kenmare peninsula, and Cumeennapiast, high up in the Reeks. But if the aquatic animal denoted by the name Carrabuncle be indigenous in Ireland, at least as a subjective animal, its name (which is apparently unknown to Gaeldom outside of the Kingdom of Kerry) is obviously exotic. Whence, then, came this name? The question seemed to me absolutely insoluble until a year or so after my visit to Brandon, when reading Wallace's *Travels on the River Amazon* I came across a curious reference to a South American "Carrabuncle," which, as the French would say, gave me furiously to think. The reference occurs in the chapter on the aborigines of the Amazon, where, discussing the legend of the female warriors or amazons said to inhabit the upper reaches of the great river, he says:—"I fear the story of the Amazons must be placed with those of the Curipura, or Demon of the Woods, and Carbunculo of the Upper Amazon and Peru." Here we have the Spanish and Portuguese word "Car-

bunculo" applied to what would appear to be a mysterious aquatic animal, and the well-known fact that the Spaniards had long-continued intercourse with south and south-west Ireland suggested the possibility of working out an interesting connection between Lough Geal and the remote Amazon Valley. It might very well have been that some of the followers of the intrepid Spanish *conquistadores* who had fought in Peru had settled in, or at all events visited, Kerry, and brought with them the name of the mystic Amazonian "Carbunculo." Such a fine mouth-filling word would have caught the fancy of the Kerryman and ousted the less sonorous *ῥιὰρτ*.

Keen to follow up the scent, I at once wrote to Dr. Wallace, asking for further particulars of the Carbunculo, but he dashed my hopes by replying that he had forgotten all about it, though he thought it likely that Mr. Bates, his companion in much of his Amazon travels, would be able to assist me. Mr. Bates, then Secretary of the Geographical Society, was written to, but with no better result. He knew nothing about the Carbunculo, and had long since ceased, as he told me, to take any interest in such things. So the question still remains open and may be recommended as an interesting one to engage the activities of any member of this Club who may be in touch with the Jesuit missions of the Upper Amazon. Sir Thomas Brown, discussing the Carbuncle, the precious stone, not the inhabitant of Lough Geal, says, in his *Vulgar Errors*, that most fascinating treatise on Unnatural History:—"Whether a carbuncle doth flame in the dark or shine like a coal, though generally agreed on by common believers, is very much questioned by many."

This long-winded discussion of the "Carrabuncle" is given here as an admirable example of a folk-lore wild-goose chase.

The next of my subjective animals is the *Ḃac uirge*, or the Water Horse. This appears to be quite a rare animal in Ireland, though common in the Western Highlands of Scotland, where the "Carrabuncle" is unknown. Campbell of Islay in his famous *West Highland Tales* has much to say about the *Ḃac uirge*, and tells us that descriptions of the

animal given by Gaelic eye-witnesses are so minute and circumstantial that English sportsmen looking for something to kill have gone in quest of it. Campbell himself was fortunate enough to get a full description from a Highland man who when out fowling one day caught sight of the animal in a lonely loch. He waded out into the water, hoping to get a shot at the monster, then seventy yards distant, but failed. The animal disappeared, yet not so quickly but that the Highland man had time to note that its neck was 2 feet 11 inches long. Campbell regrets that the Highland man had not taken his long bow with him on this occasion instead of his fowling piece. If he had he might have bagged the *Eac Uirge*.

I have only once come on the track of the *Eac Uirge* in Ireland. It was in Connemara in 1897. I was out on Lough Inagh one evening near nightfall dragging for *Isoetes echinospora* from a boat rowed by my landlord, Joyce of Cloonacartan, and when returning (without the *Isoetes echinospora* but with an interesting variety, *falcata*, of the common species) Joyce pointed me out a grassy land-spit running into the lake where some years ago a friend of his had seen the water-horse emerge from the lake. Having pranced about and shaken his mane for a few seconds, the animal returned with a mighty splash to his accustomed habitat.

MacDougall, in his *Folk and Hero Tales of Argyle* thus endeavours to rationalise the *Eac Uirge* :—"The Water Horse, I believe, is nothing else than the personification of the sudden blast of wind or whirlwind which sweeps over the surface of the lakes of the winding glens of the highlands. The whirlwind strikes the water suddenly, leaves behind it a ripple like the wake of a living creature swimming beneath the surface, and then, halting for a moment, raises a few inches above the surface a dark crest of little waves which bear a remote resemblance to the back and mane of such a creature." This may very well have been the occasion of individual appearances of the Water Horse, but no doubt the existence in legend of the animal long ante-dated such particular appearances. The idea of the animal, in fact, must have been already in the mind of the observer when the whirlwind brought the animal itself to his startled

vision; and I am inclined to believe with Campbell of Islay that the idea did not originate in the Highlands, but was more probably inherited with modification from far distant ages when water gods found a place in mythology.

Sandycove, Co. Dublin.

SOME IRISH ICHNEUMONOIDEA.

BY REV. W. F. JOHNSON, M.A., F.E.S.

I have managed during the past year to pick up a few more of these interesting insects, though I did not meet with as many species as I had hoped for.

The season was not a good one for insects as far as I was concerned, probably on account of the great humidity of 1912. I have, however, been fortunate enough to capture some rare species, and among them some which Haliday described from specimens taken in Ireland. As our knowledge of the distribution of the sub-order in Ireland is very meagre, and anything but complete in Great Britain, the term "rare" must be taken only as applying to our present knowledge.

Most of my captures were made here, either in my fields, or on the road between my house and Poyntzpass, the latter locality being indicated by the word "hill."

I was greatly struck by the remarkable preference shown by these insects for flowers of Umbelliferae. Though there were other flowers the flies quite neglected them, and congregated on the Umbelliferae. I have again to thank Mr. Claude Morley, F.E.S., for kind help in the determination of critical species.

ICHNEUMONINAE.

Cratichneumon rufifrons, Grav.—Poyntzpass hill in June.

C. fabricator, Fab.—Coolmore in September. These specimens, which are males, appear to be referable to the var. *impugnator*, Wesm., with the hind femora black.

C. annulator, Fab.—Poyntzpass hill in June.

Melanichneumon nudicoxa, Thoms.—Coolmore on the roadside, in September, rare; recorded on the Continent from Germany, France, Spain, and Italy.

Barichneumon albicinctus, Grav.—Coolmore on Umbelliferae on the roadside in September.

B. lepidus, Grav.—Coolmore on Umbelliferae in September.

Ichneumon sarcitorius, Linn.—Poyntzpass hill in May.

I. stramentarius, Grav.—Poyntzpass in fields at Angelica in August, not common.

I. extensorius, Linn.—Carlingford under a large stone on a bank in July.

I. gracilentus, Wesm.—Coolmore on Umbelliferae, in September, rare.

I. primatorius, Forst.—A specimen of this fine fly was taken by Mr. L. H. Bonaparte-Wyse at Tramore, Co. Waterford, in July.

I. caloscelis, Wesm.—Poyntzpass, in fields at Umbelliferae, in July.

Probolus alticola, Grav.—Poyntzpass hill in June.

Herpestomus brunnicornis, Grav.—Coolmore on sandhills at Umbelliferae, in September.

Phaeogenes cephalotes, Wesm.—Poyntzpass hill in July, rare.

Colpognathus celerator, Grav.—Poyntzpass, in fields at Angelica, in August.

Hemichneumon elongatus, Ratz.—Poyntzpass, at Angelica, in fields in July and August, rare.

CRYPTINAE.

Cubocephalus fortipes, Grav.—Poyntzpass, in fields in July, rare; recorded from the New Forest and Devonshire.

C. brevicornis, Tasch.—Poyntzpass, at Angelica, in August, rare.

Microcryptus perspicillator, Grav.—Poyntzpass hill, in June.

M. graminicola, Grav.—Poyntzpass, at Angelica, in August.

Glyphichnemis profligator, Fab.—Poyntzpass, in fields, in August.

G. brevis, Grav.—Poyntzpass, in fields in August; Coolmore, at Umbelliferae, in September.

Phygadeuon nitidus, Grav.—Coolmore, on roadside, in September.

P. fumator, Grav.—Coolmore, on the sandhills, in September.

Hemiteles cingulator, Grav.—Jerrettspass, on Umbelliferae at roadside, in June.

H. similis, Gmel.—Poyntzpass, in fields, in July.

H. ridibundus, Grav.—Coolmore, on roadside, in September.

Stilpnus gagates, Grav.—Poyntzpass hill, in June.

Atractodes compressus, Thoms.—Coolmore, on roadside, in September; taken by Haliday at Holywood, Co. Down.

Pycnocryptus peregrinator, Linn.—Poyntzpass hill, in June.

PIMPLINAE.

Pimpla similis, Bridg.—Coolmore, on roadside, in September, rare; recorded from Rossbeigh, Co. Kerry.

- Glypta elongata**, Holmgr.—Poyntzpass, in fields, in July, a variety with black abdomen occurred.
- G. fronticornis**, Grav.—Poyntzpass, at Angelica, in August, rare.
- G. genalis**, Moll.—Poyntzpass, in fields, in July, very rare. Mr. Morley says:—"The only specimen I have seen is a female in Marshall's collection in the British Museum; it is labelled by Billups—'From *Taeniocampa miniosa* Mr. Fenn'—and on the same card is its own transparent papyraceous cocoon, which is cylindrical and nearly colourless." I took it at Coolmore, as already recorded, *Irish Naturalist*, xxii., p. 140. This species is remarkable for the peculiar beak-like production of the face owing to the great length of the cheeks.
- G. annulata**, Bridg.—Poyntzpass, in fields, in July; rare.
- G. bifoveolata**, Grav.—Coolmore, on roadside, in September.
- Lissonota bellator**, Grav.—Coolmore. I obtained a curious variety of this common species with the areolet pentagonal.
- L. errabunda**, Holmgr. }
L. dubia, Holmgr. } Coolmore, in August, 1912, at Wild Carrot.

TRYPHONINAE.

- Homocidus cinctus**, Grav., var. **lateralis**, Thoms.—Poyntzpass hill, in June. This variety has the three or four basal segments of the abdomen with the lateral angles alone pale. I also took a variety with the abdomen entirely black.
- H. tarsatorius**, Pauz.—Poyntzpass hill, in June. A very widely distributed species extending eastwards to India.
- H. fissorius**, Grav.—Poyntzpass hill, in June. Haliday's MS. mentions it as common in Ireland.
- H. pictus**, Grav.—Poyntzpass, hill, in June.
- Promethus scutellaris**, Bridg.—Poyntzpass, emerged on July 31st from pupa on a blackberry leaf, which Mr. Morley tells me is that of a Syrphid; rare. Mr. Morley notes it from Surrey and Devon.
- P. cognatus**, Holmgr.—Poyntzpass, at Angelica, in August.
- Mesoleius semicaligatus**, Grav.—Poyntzpass, in fields, in July and August.
- Tryphon trochanteratus**, Holmgr.—Poyntzpass, in field, in July.
- Exenterus aurifluus**, Hal.—Coolmore, on Umbelliferae, on roadside, in September, rare. Haliday records it as occurring in Ireland on willows from May to September. It has been taken at Enniscorthy and at Louisburgh, but the only English locality given is the marshes at Brandon, Suffolk, *vide* Morley, *Brit. Ich.*, iv., p. 210.
- Mesoleptus typhae**, Fourc.—Poyntzpass, on Angelica, in August.
- Euryproctus notatus**, Grav.—Coolmore, on roadside, in September, Carlingford, in May.
- Perilissus filicornis**, Grav.—Poyntzpass, in fields, in August.
- P. rufoniger**, Grav., var. **vernalis**, Grav.—Jerretzpass, on Umbelliferae on roadside, in June. This variety has the abdomen pale from apex of first to base of fifth segments.

Polyblastus variitarsis, Grav.—Poyntzpass, in fields, in July and in August, at Angelica. This genus is remarkable as being the only one in which the female carries the eggs or larvae extruded on the apex of her abdomen. It is not yet clearly ascertained how long the eggs or larvae remain with the female, nor how they are conveyed to their host larva, which is said to be that of a Tenthredinid. Mr. Morley suggests that "in order to avoid individual death through the superabundance of their host's vitality, whole broods of these parasites are deposited at once on their host larva." These eggs or larvae are very curious-looking objects. I found some on a female that I captured. They were somewhat oval in shape, about half a millimetre in length, and attached to the parent by a little peduncle, while at the opposite extremity there was a thread-like process projecting outwards. These objects had to me the appearance of eggs, but, of course, being dead it is hard to be certain.

Erromenus punctulatus, Holmgr.—Poyntzpass, in fields, on Angelica, in August; rare.

OPHIONINAE.

Anomalon cerinops, Grav.—Muckcross, Co. Kerry; taken by Mr. L. H. B. Wyse in June.

Cymodusa leucocera, Holmgr.—Coolmore, on roadside, in September.

Meloboris rufiventris, Grav.—Poyntzpass, in fields, in July. Coolmore, on roadside, in September.

Angitia fenestralis, Holmgr.—Coolmore, on a roadside in September.

BRACONIDAE.

Bracon variator, Nees.—Poyntzpass hill, in August.

B. osculator, Nees.—Coolmore, on Umbelliferae, in September.

Microplitis medfana, Ruthe.—Poyntzpass, in August; Belfast, in June.

M. globatus, Nees.—Poyntzpass, in fields, in July.

Microgaster tibialis, Nees.—Poyntzpass, on Angelica, in August.

Eubadion flavipes, Hal.—Poyntzpass, on Angelica, in August; rare. Rev. T. A. Marshall, in his "Monograph of British Braconidae," *Trans. Ent. Soc.*, 1889, p. 153, says "Inhabits north Ireland but rarely, Haliday;" and mentions a single English specimen, "in Fitch's collection."

Diospilus oleraceus, Hal.—Coolmore, on umbelliferae on roadside, in September. Taken by Haliday on *Brassica Rapa* and *Sinapis nigra*.

CYNIPIDAE.

Figites scutellaris, Rossi.—Poyntzpass, on Angelica, in August.

Amblynotus femoralis, Cam.—Poyntzpass, on Angelica, in August.

Poyntzpass, Co. Armagh.

COLEOPTERA FROM CAVAN AND MEATH.

BY G. W. NICHOLSON, M.A., M.D.

I spent the latter half of September, 1913, in Ireland, and stayed at Cloverhill, Co. Cavan, from the 13th to the 22nd. I then went to Balrath, Co. Meath, where I remained until the end of the month. I found many interesting species of beetles in both places, and propose to give a list of these in the present paper. I will first describe my County Cavan captures, and then those from the County Meath.

I. COLEOPTERA AT CLOVERHILL, CO. CAVAN.

Nearly all my collecting was done around the shores of the lakes in the demesne of Cloverhill House. I spent one morning pulling moss in a wood 300 or 400 yards from the house. I may note the following species:—*Blethisa multifunctata*, L., common in very wet places at the edges of lakes; *Bembidium femoratum*, Sturm., a few in a turf-bog; *B. v.-striatum*, Gyll., one specimen under the bark of a log; *Badister sodalis*, Duft., one in moss; *Pterostichus aterrimus*, Pk.: it was with great joy that I found a solitary female of this exceedingly interesting species under a loose stone on the extreme edge of one of the lakes in the demesne on September 19th. This part of the lake is used as a watering place by the cattle. My impression is that this specimen had been disturbed in its winter quarters, and had taken refuge under this stone while in search of a fresh hiding-place. Although I found an ideal swamp close by, which swarmed with *Blethisa*, yet did diligent search produce no more specimens of the *Pterostichus* either here or in other very wet places around the lake. The only other Irish record of this species is from the Co. Cork,¹ where a few specimens, some of which are probably in the Haliday collection, were taken in the thirties of last century. In England it used to be common in the

¹ Johnson and Halbert, *Proc. Royal Irish Academy* (3) vol. vi., 1902, p. 571.

Cambridgeshire and Norfolk fens before they were drained, but was supposed to be extinct until Professor Beare took a specimen at Stalham, in Norfolk, in 1910.¹ *P. minor*, Gyll., not uncommon in wet places; *Anchomenus gracilis*, Gyll., common by sweeping; *A. puellus*, Dej., common on very marshy ground. *Deronectes depressus*, F.; *Hydroporus umbrosus*, Gyll., in moss by the side of a lake; *Rhantus exoletus*, Forst., in a ditch.

Omalium vile, Er., one in moss; *O. caesum*, Gr., several specimens in a large fungus on an old elm; *O. punctipenne*, Th., under the bark of a log; *Acidota crenata*, F., one in moss in a wood; *Stenus fuscipes*, Gr., *S. carbonarius*, Gyll., *S. bifoveolatus*, Gyll., in moss by the side of a lake (the last two species have been already recorded from the Co. Cavan, see Johnson and Halbert, *l.c.*); *Evaesthetus ruficapillus*, Lac., very plentiful in company with the preceding; *Paederus riparius*, L., not uncommon in hay-refuse; *Lathrobium quadratum*, Pk., five specimens in moss by side of lake; *L. terminatum*, Gr., plentiful with the preceding; *Othius melanocephalus*, Gr.; *O. myrmecophilus*, Kies.; *Actobius cinerascens*, Gr., very common in swamps, and in wet moss; *Philonthus umbratilis*, Gr., *P. fumarius*, Gr., by shores of lake; *Staphylinus caesareus*, Ceder.; *S. erythropterus*, L.; *Myllaena dubia*, Gr., in damp moss; *Oligota inflata*, Mann.; *Alcochara succicola*, Th.

Rybaxis sanguinea, L., very common in wet moss by the side of a lake. Most of the specimens were somewhat immature; *Bythinus bulbifer*, Reich.; *B. validus*, Aubé, two specimens in moss in a wood; *Pselaphus dresdensis*, Hbst., two specimens by the side of a lake in a piece of moss that had been scraped up by a rabbit. Although I devoted considerable time in an attempt to find more of this species, I was unsuccessful. *Neuraphes elongatulus*, Müll., one in moss in a wood.

Choleva agilis, Ill., one in flood refuse; *C. Wilkini*, Spence, several in moss in a wood; *Agathidium margina-*

¹ *Ent. Mo. Mag.*, xlii., p. 281.

tum, Sturm., one in a fungus on an elm ; *Sericoderus lateralis*, Gyll., with the preceding ; *Scaphisoma agaricinum*, L., several in a boletus.

Octhebius pygmaeus, F. ; *Hydraena Britteni*, Joy, in moss by the side of a lake.

Cryptophagus scanicus, L., in profusion at the bottom of haystacks, and in a fungus on an elm ; in the latter place I found four specimens of the var. *patruelis*, Sturm. ; *C. affinis*, Sturm., together with the preceding ; *Ephistemus gyrenoides*, Marsh., in a Boletus ; *Enicmus histrio*, Joy : I took two specimens of this species, which I have recently added to the Irish list,¹ from a tuft of hay that was lying in a meadow. I have no doubt that it is common in Ireland, and confused with *E. transversus*, Ol. *Cis nitidus*, Hbst., common in a large Boletus ; *Parnus luridus*, Er. (= *P. prolifericornis*, Brit. Coll.) in a swamp ; *Corymbites cupreus*, F., one specimen, which was hibernating, in a turf stack. This is, in my experience, a very unusual time of year to take the imago of this species.

Phyllodecta vulgatissima, L., by sweeping at edges of lakes ; *Phyllotreta exclamationis*, Thunb., by sweeping ; *Mniophila muscorum*, Koch., a nice series from moss in a wood.

Sciaphilus muricatus, F., in moss in a wood ; in the same spot I found several *Liosoma ovatum*, Clair., and one specimen of the var. *collare*, Rye ; *Hypera trilineata*, Marsh., in hay-refuse ; *Anthonomus comari*, Crotch, by sweeping.

2. COLEOPTERA AT BALRATH, CO. MEATH.

Although I have, during the last few years, worked this locality pretty consistently on my visits to Ireland, I am still constantly turning up new species here. I now have great pleasure in bringing forward the following additions to the Irish list :—

1. *Quedius fulvicollis*, Steph.—One specimen out of

¹ *Irish Naturalist*, xxii., p. 49.

very wet sphagnum on the "Home Bog" on September 26th, and another on the next day within a couple of feet of it.

2. *Tachyporus transversalis*, Gr.—Three specimens shaken out of a large tuft of sphagnum on the "Home Bog" on September 27th.

3. *Gyrophæna pulchella*, Heer.—A short series from some ground fungi under pine trees in the "Bog Wood" on September 26th.

4. *Ips. iv. punctata*, Hbst.—One from under a dead squirrel in the "Bog Wood" on September 26th.

5. *Ceuthorrhynchus chalybaeus*, Germ.—Three specimens by sweeping *Sisymbrium officinale* on September 23rd. If I had known at the time that this species is new to Ireland, a fact which I did not discover until I had named my specimens, I could, no doubt, have procured many more.

In addition the following species deserve mention:—*Pristonychus terricola*, Hbst., under the bark of a dead Ash; *Hydroporus vittula*, Er., not uncommon in a ditch; *Agabus affinis*, Pk., three specimens in wet sphagnum on the "Home Bog"; *Omalium vile*, Er., in plenty under the bark of logs; *Syntomium aeneum*, Müll., one by sweeping on the "Home Bog"; *Actobius cinerascens*, Gr., a few in sphagnum; *Philonthus nigrita*, Nord., several in sphagnum on the "Home Bog"; *Staphylinus erythropterus*, L., I had never met with this species here before; *Mycetoporus lepidus*, Gr., one by sweeping; *Hygronoma dimidiata*, Gr., not uncommon by sweeping over very damp places on the "Home Bog"; here also I secured a nice series of *Gymnusa brevicollis*, Pk., both by sweeping and by wringing out the wettest sphagnum I could find.

Epuraea obsoleta, F., in a Boletus on an Ash-stump; together with it there occurred *Rhizophagus perforatus*, Er.; *Cryptophagus setulosus*, Stm., by sifting pine-needles; *Ephistemus gyρινoides*, Marsh., common in some fungi.

Phyllotreta exclamationis, Thunb., by sweeping; *Longitarsus holsaticus*, L., an occasional specimen by sweeping

on the "Home Bog"; *Cassida vibex*, L., one in the same place, by sweeping.

Hypera polygona, L., one in wet sphagnum; *Ceutorhynchus floralis*, Pk., common; *Poophagus sisymbrii*, F., abundant on *Nasturtium*; *Orobatis cyaneus*, L., in moss; *Anthonomus comari*, Crotch, by sweeping; *Apion haematodes*, Kirby; *A. Gyllenhali*, Kirby, by sweeping.

Oxford and Cambridge Club, London, S.W.

NOTES.

BOTANY.

Amblystegium Kochii in Ireland.

I have found this mass growing in small quantity, in a marsh adjoining one of the lakes, near Kilrea. A specimen has been sent to Mr. H. N. Dixon, who has kindly verified its identification.

J. D. HOUSTON.

Kilrea.

ZOOLOGY.

Waxwings in Ireland.

The incursion of Waxwings (*Ampelis garrulus*) which has been recorded from many parts of England—beginning about November 10th—has also extended in a lesser degree to Ireland. Mr. Foster has recorded one from Tyrone, and on January 20th Mr. Thomas Plunkett, of Enniskillen, kindly sent me a specimen killed (shot) near Blaney Bay, Lough Erne, Co. Fermanagh. These incursions of Waxwings have lately occurred in Ireland at intervals of ten years, *i.e.*, winters 1893-4, 1903-4, 1913-14. If we omit the records for these years, there would appear to be only about six occurrences in Ireland since the fifties of the last century. East Prussia has also been invaded by Waxwings this winter.

ROBERT M. BARRINGTON.

Fassaroe, Bray.

Waxwing in County Fermanagh.

The "Nature Notes" column of the *Northern Whig*, of 31st January, 1914, records the capture of a Waxwing near Ely Lodge, Lower Lough Erne, "about a fortnight ago." This is the first record of this species from Co. Fermanagh.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

JANUARY 28.—ANNUAL GENERAL MEETING was held at Leinster House, Sir C. BALL (President) in the Chair. The Secretary (Prof. CARPENTER) submitted the Annual Report and moved its adoption.

The statistics of attendance of Members and Visitors at the Zoological Gardens during 1913 (162,618) show a rather considerable decrease when compared with those of 1912 (185,265). The decrease of £133 in gate money, as compared with 1912, is more than counterbalanced by the increase of £180 in Members' entrance fees and subscriptions. The falling off in the numbers of visitors was due to the labour troubles in Dublin and the partial dislocation of the tramway service during August—usually one of the most profitable months in the year. The large influx of new members during 1913 justifies abundantly the Council's action a year ago in proposing an extension of the members' privileges. It is especially gratifying to record the election of twenty five new Life Members, twice as many as joined the Society during 1912.

With the deepest regret will members of the Society miss one most distinguished name from the list of Past Presidents, for in November, 1913, Sir Robert S. Ball, F.R.S. died. Like his father and brothers, he took for many years a great interest in the Society, serving on its Council from 1874 till 1902, and holding the position of President from 1901 until he resigned the Royal Astronomership of Ireland to become Lowndean Professor at Cambridge in the next year. His love for the Royal Zoological Society and his interest in its welfare and progress were true and sustained; whenever he revisited Dublin he was a welcome attendant at the Council, whose members all realise that in his passing hence another link is severed with the group of great Victorian men of science who worked hard and faithfully for the Society.

The year 1913 has also brought a much felt loss to the Society in the death of Patrick Supple, the faithful and devoted keeper of the Monkey House, who had worked in the Zoological Gardens for more than fifty years. The unwearying care which he bestowed on the creatures under his charge were known to all, and he leaves a memory of willing and efficient service which the Council warmly appreciate. It is interesting to note that he came into the Gardens as a boy helping his father, and that he is now succeeded by his son, John Supple, whom he had himself trained as his assistant.

The Hon. Walter Rothschild's great Chimpanzee, "Tom," continues in excellent health, and his temper shows some improvement since he first became an inmate of the Monkey House. Two smaller Chimpanzees were purchased during the year; the male, unfortunately, died in December, but the female is still lively and well. A very attractive pair of Orang-utans were also bought; both remained well and cheerful for the greater part of the year, but in the last week of December the female died. These losses are much regretted by the Council, as is also the death

of the Hoolock Gibbon generously given in 1912 by D. J. M. Falkiner. Several deaths of smaller monkeys have taken place, including one of the Vervets on deposit from the King's African Collection, and a Red Howler, which lived only for a few weeks in the Collection. Among gifts a fine Yellow Baboon from Captain Furnell is noteworthy. Our collection of Lemurs is still extensive, and a beautiful specimen of the curious Aye-aye from Madagascar, very rarely seen alive in Europe, was purchased early in the year, and is still in excellent health. It feeds freely on soaked cake, which it slowly collects with the long and slender third finger, whose normal function is to pick succulent grubs out of timber.

The famous collection of Lions has been well maintained during the year, the only death being the first cub of "Conn" and "Mitze," born—a solitary female—in March, and dying the day after her birth. In August the same pair had two healthy cubs—male and female—which are doing well. Two families of cubs were born at the beginning and the end of the year respectively, "Red Hugh" and "Nigeria" being the parents. On January 22nd there were three males and two females, and on December 25th a litter of one male and three females. The very valuable gift of a pair of wild West African cubs was received from Lieutenant Ackland, R.N. These handsome animals, on arrival, were remarkable for the sleek texture and deep brown colour of their hair; after a few months' residence in the Lion House the coats became paler and somewhat more furry. As usual, some of the stock has been exported during the year. The young Lioness, "Dido II.," and a pair of the "Red Hugh"—"Maive" cubs (born in 1912) were sold. The other pair of the same litter were selected for presentation to the newly-established Zoological Park at Edinburgh. This gift was made with special acknowledgment to the invaluable services rendered to the Royal Zoological Society of Ireland by one of Edinburgh's most distinguished men of science—the late D. J. Cunningham. From the five "Red Hugh"—"Nigeria" cubs born in January, 1913, a pair were sent to the Toronto Zoological Gardens in exchange for Beavers.

The stock of Lions now stands at twenty-three—twelve males and eleven females.

A serious loss has been sustained by the death of the Tiger "Rajah," which the Nizam of Hyderabad gave to the Society in 1900. A splendid tame Cheetah, given and personally brought home by Captain H. C. Dobbs, is a most welcome addition, as it is many years since one of these interesting beasts was on view in Dublin. The Council would record their warm thanks also to Major Kirkpatrick, who secured a pair of Snow Leopards from the Himalaya, and presented them to the Society; unfortunately these valuable animals both died before their shipment from India had been arranged. The collection of Pumas has increased, as three handsome and healthy cubs were born in August. The birth of six more Dingo puppies is also worthy of record. One of the young Pumas has been exchanged for a Himalayan Bear, and a very tame and lively Brown Bear—"Nelson" by name—was received as a gift from Messrs. Wallis, of London. A young Sea-lion was bought during the year.

The female Indian Elephant, "Roma," purchased in 1912, continues in good health and has grown to a fair size. The Council are deeply grateful to the Maharajah of Mysore for generously giving a young female, three years old, "Sandari" by name, and sending an Indian keeper to Dublin in charge of her. She is a docile and healthy animal, remarkable for the rich growth of hair still apparent on head and back. The Maharajah gratified the Society by accepting its gold medal.

Among the hoofed animals, the pair of Bison—offered to the Society by the Government of the Dominion of Canada in a letter from the late Lord Strathcona, and brought to Dublin late in August under the superintendence of Mr. Maxwell Graham—form a most welcome and valuable addition to the collection. It is eleven years since an American Bison was on view in Dublin. The pair now acquired come from the large herd kept by the Canadian Government on the extensive park near Banff, Alberta. The warmest thanks of the Society are due for this generous gift, the transport of which was kindly facilitated by the Canadian Pacific Railway and the "Head" Line of steamships, by which the animals were conveyed safely and at a reduced freight direct from Montreal to the Liffey. Another noteworthy event of the year was the birth in August of a second Grant-Burchell Zebra male foal; like the previous hybrid offspring of the same parents, this specimen's richly striped coat resembles that of the father (Grant's Zebra) rather than that of the mother (Burchell's Zebra). The month of December brought two serious losses to the collection of Ungulates in the death of the Brindled Gnu, the gift of the Duke of Bedford, which had lived in the Gardens since 1905; and of the Dromedary.

From the Zoological Gardens of Toronto six Canadian Beavers were sent in the summer in exchange, as mentioned already, for a pair of Dublin Lion-cubs. One of the Beavers died on the voyage, two others quickly after their arrival in June, and two more in the succeeding month, so that only one now survives. He finds satisfactory quarters in the end compartment of the Seal Pond, where a house-box and a number of logs have been provided for his use. Several Squirrels of different species have been acquired during the year, including a group of ten American Grey Squirrels, for which a small enclosure near the Nesbitt Aviary has been made. Three Tree Porcupines were bought, and in June a young one was born in a new open-air cage beneath the Haughton House. But, unfortunately, all these died before the close of the year. The Hairy Armadillos are still the only representatives of the Edentata in the collection. In October Mr. H. B. Rathborne kindly presented a Tamandua Ant-eater, but it survived only a few weeks. Another pair of Black-tailed Wallabies were born in March but one of the older females has since died.

The stock of larger Birds has been replenished by the purchase of a pair of Flamingoes and a pair of Storks. Three young Rheas were hatched in the spring, and the White Swans reared nine cygnets. The pair of Black-necked Swans on the upper pond brought out two cygnets, which promised remarkably well for a few weeks, and then, unhappily, died. The most

serious loss among the Birds was the death of the South American *Cariama* given by Sir Robert Casement. Little has to be recorded of the collection of cold-blooded creatures. The two Tuataras from New Zealand still form the most noteworthy feature among the Reptiles, and the Axolotls continue to breed freely. The first season of operations in the Fish Hatchery has passed with considerable success. The Fisheries Office gave 10,000 ova of the American Rainbow Trout, among which there was heavy mortality, but enough fry survived to stock well, with the addition of grown fish given by Mr. F. C. Stenning, the large fish-pond and some of the aquarium tanks. The Brown Trout and Salmon ova given by the Department thrived well; only among the undeveloped salmon eggs received in December, 1912, was there any considerable mortality. At the end of the hatching season 20,000 salmon fry and 1,000 Brown Trout fry were handed over to the Riparian Owners of the Liffey.

The improvements to the Haughton House were successfully completed by mid-summer of the past year, and the whole outside of the House has been repainted. The enlarged Members' Room has proved very popular with those privileged to use it; while the increased size of the kitchen and the provision of a new store-room, make the work of the staff far easier than formerly. In consequence of the extension of the whole width of the upper floor of the building, 10 ft. towards the north, a spacious covered area has been made available for the use of large parties visiting the Gardens. And the additional open-air cages beneath the extended balcony have been well occupied.

Small, but important and necessary, pieces of work carried out during the year have been the construction of a new roof and the installation of new heating apparatus for the Elephant House at a cost of £60, and the erection of several small dens for bears and other Carnivora on the area behind the Seal Pond. A larger den, open for the most part to the air, for the Brown Bear, "Nelson," now rapidly growing, will be undertaken immediately. A large paddock for the newly-arrived Canadian Bison has been enclosed in front of the Hospital and close to the entrance gate. Into this paddock the Bison were readily turned out from the small isolation pen to which they had been confined after their arrival, and the animals much appreciate their comparative liberty.

Foreseeing the need of increased space in the future, and the desirability of exhibiting animals, whenever possible, in large paddocks rather than in confined pens, the Council has requested the Commissioners of Public Works to take into favourable consideration the possibility of granting an extension of land to the Society on the north side of the Gardens. Such an extension would bring the Garden boundary close to the road passing the Constabulary Depot—a road which runs at the extreme edge of the Park, and is virtually a public thoroughfare, so that from it a sight of many animals in the Gardens might be obtained by passers-by. An extension of the Phoenix Park tramway line along this road, bringing the cars to within a few yards of the entrance gate of the Zoological Gardens, would be a great advantage to the Society and a boon to the public.

The Treasurer (Dr. MACDOWEL COSGRAVE) seconded the adoption of the Report. The balance in hand of £636 at the beginning of 1913 has been replaced by a debt of £88 at the end of the year, during which expenditure was very heavy, including £408 for purchase of animals, £1,220 for provisions, £1,262 for salaries and wages, and £925 for new buildings.

The Report and Statement of Accounts were then adopted.

The President presented the Society's silver medal for the best set of photographs taken in the Gardens during the year to W. N. Allen; a special bronze medal was awarded to H. Hanna, K.C. On the motion of the President, General the Hon. Sir Neville Lyttleton, G.C.B., was elected an Honorary Member of the Society. The Officers and Council for 1914 were then chosen, M. F. Headlam, S. F. Cochrane, and J. Laidlaw filling the usual three vacancies caused by retirement. At the subsequent Council Meeting Dr. R. F. Scharff was elected a Permanent Vice-President of the Society, having served continuously on the Council for twenty-two years, during eight of which he acted as honorary secretary.

Professor J. A. SCOTT described the principal events of the year at the Zoological Gardens, showing in illustration an excellent series of lantern slides and some cinematograph films.

A young female Gorilla, with a small male Chimpanzee as its companion, was bought immediately after the Annual Meeting. The Gorilla is by far the scarcest of the Anthropoid Apes in captivity, and this specimen, believed at present to be the only member of its species in Europe, is exceptionally healthy and friendly. Those interested in the animals which approach Man most nearly in structure should not miss the opportunity now afforded them of seeing in the Dublin Monkey-house a Gorilla, three Chimpanzees, and an Orang-utan.

DUBLIN MICROSCOPICAL CLUB.

JANUARY 14.—The Club met at Leinster House.

D. M'ARDLE (Vice-President) in the chair, showed the cell structure of *Pleurozia cochleariformis*; on account of the large hyaline trigones and deep red or purple colour of the cell walls it is an attractive object. The principal exhibit was the lobule which is attached to the lower portion of the leaves; it is ovate-utriculate in shape, and besides containing a supply of moisture for this large liverwort, which often grows in exposed places, it has one of the most remarkable contrivances for catching small insects it is possible to imagine. On the inner face of the lobule is a deep fold having at the base a slit with two decurrent wings which hang free within, one of these is concave at the base; beneath the slit (the only entrance which an insect can creep through) the lid opens with the slightest pressure and closes after the prisoner has been secured; the remains of insects are frequently found in these lobules. A portion of the tissue over the trap was raised off with the dissecting knife to show the lid, which is formed of the most delicate tissue. A drawing of the

lobule was exhibited showing the longitudinal fold, the two decurrent wings, and the slit at the only entrance to the interior of the lobule. Specimens of the plant were shown collected in Co. Wicklow.

Prof. G. H. CARPENTER showed puparia of the Tsetse-fly *Glossina palpalis* (which carries the Trypanosoma of sleeping-sickness) from Uganda, East Central Africa. The female of this species gives birth to a mature larva which pupates among dense vegetation near the lake or river banks. Though the flies are now not scarce in museums the puparia have been collected only by the few entomologists who have studied the problems presented by tropical diseases in Africa.

Sir F. W. MOORE exhibited *Lemna arrhiza*, the most minute of all Phanerogams. Each little plant consists of a tiny globular mass of tissue, sometimes rather flattened, smaller than a grain of No. 8 shot. It is found floating on the surface of the water in small ponds, and is very local. In winter many of these tiny plants sink to the bottom, and rise again when they commence to increase by budding. Flowers had not been seen on any of the plants cultivated by the exhibitor. The species is found in the south of England, but is unknown in Ireland.

W. F. GUNN showed a slide of the diatom *Licmophora flabellata* (Sm.) using the dark ground method of illumination in which the central rays of the cone of light are stopped out and the lateral rays converge on the object. *Licmophora flabellata* is one of the two known British species. The frustules are wedge shaped and produced on the tips of a branched stipes or stem, which are expanded into a curved disc-like shape. As the frustules remain after division, attached to the ends of the branches, they spread out laterally and form a beautiful and regular fan. According to the authors of the Micrographic Dictionary "the development of the stipes to which the frustules of many genera are attached is at present altogether a mystery."

BELFAST NATURALISTS' FIELD CLUB.

JANUARY 20.—R. J. WELCH in the chair. R. H. WHITEHOUSE, M.Sc., read the paper with which he had opened a discussion at the British Association Conference of Delegates held at Birmingham last summer. First giving a general account of what took place at the Conference which he had attended as representative of the Club, the lecturer then read the paper he had delivered on "The Best Means of Preventing the Extinction of Local Species." He said the reformer would experience great difficulty in devising any practicable scheme to reduce the destruction of animals and plants wrought by thoughtless members of the community. Discussion of the best means to be adopted would be the more profitable if they placed themselves in the position of people affected by any measures. Unfortunately some people were inclined to regard any prohibiting measure as an interference with their personal liberty, and reformers must take this into consideration. Destruction of animals and plants sometimes occurred over which they had no control; the construction of public works, like reservoirs, often affected a whole area. Drainage schemes,

the construction of railways, all those caused extinction of plants, and left them with no remedy to prevent it. Transplanting had been suggested, but that was not a scientific remedy, as natural distribution was thereby affected.

Among the people who were accused of causing the annihilation of plants from a neighbourhood was the teacher of nature study. There were instances known where a class of children had been seen rooting up every specimen of a rare plant to secure specimens, but an exhaustive inquiry would most probably show that such occurrences were extremely rare. Nature study teachers as a rule were the people who were most anxious to preserve the local fauna and flora, and were the first to do what they could to prevent their extinction. Still it would be well to emphasise the fact that the teaching of botany could be as well accomplished, usually better, with the commonest plants as with the rare.

The professional collector was generally regarded as a serious offender, but did not the fault really lie with the purchaser? If our natural history societies could undertake the supply of rarer material, they might here find a remedy against utter destruction. If every society possessed itself of a complete list of the fauna and flora of its neighbourhood interchange of specimens might be brought about through the societies. With such a list it would be quite possible to inform all the teachers and others interested in biology of the rarities of a locality (without indicating the exact spot), so that such might be carefully avoided and so protected. Much valuable assistance against wholesale destruction of plants might be obtained from the Press—most of the daily papers published nature notes and here it might be strongly emphasised that it was desirable to cultivate a real pride in the district's possessions in the way of animals and plants. It was a moral claim they had to make, and that was usually the most difficult to accomplish. More harm than good would arise from legislative reforms; the Britisher refused to allow the country to be Russianised. It is everybody's duty to do his best to cultivate a pride in the fauna and flora of his district, and do his best to prevent ruthless destruction, except where animals and plants had been clearly proved to be harmful.

The CHAIRMAN, opening the discussion on the paper, said that there was no doubt that many local species became exterminated by the extension of large towns, and that in this case it seemed hopeless to try to save the rarer plants. On the other hand, much could be done by education. First, educate the teachers of nature study, and they in their turn would undoubtedly influence their pupils. He himself knew of at least one district in England where this plan had succeeded beyond all expectations. A. W. STELFOX said he was sure that all members of the botanical section would agree in the main with Mr. Whitehouse's paper, especially where he recommended no artificial preservation for preventing the extinction of plants. One serious source of danger to the fauna and flora of parts of the country, especially in England, had not been mentioned by Mr. Whitehouse, and that was the serious effect the dust from roads which had been covered with tar macadam had on them.

JANUARY 28.—GEOLOGICAL SECTION.—Dr. DWERRYHOUSE, F.G.S. lectured on "The Coal Reserves of the World." Some interesting figures based on the report of the International Geological Congress in Canada, were placed before the meeting, and proved reassuring to those who went to the meeting prepared to hear the worst. In the course of his remarks the lecturer pointed out that coal is by no means confined to the Coal-measures, the highest division of the Carboniferous system, in which it occurs almost exclusively in Great Britain, but is found on all geological horizons from the Devonian to the Tertiary systems. The discovery quite recently of a 4 foot seam of brown coal some eighteen feet from the surface in the Tertiary near Portrush was alluded to. A discussion followed the lecture, in which the chairman (Robert Welch), W. A. Green, Miss M. K. Andrews, and others took part.

FEBRUARY 4.—ARCHAEOLOGICAL SECTION.—A lecture on Irish Bells was delivered by F. J. BIGGER. Commencing his lecture by recounting some of the legends connected with Irish bells, Mr. Bigger followed with the quaint old story of the lost bells of Limerick and the buried bells of several old churches. The Columbian and Patrician cycles were also dealt with, and, among many other items the origin and use of ancient round towers for bell-ringing.

DUBLIN NATURALISTS' FIELD CLUB.

JANUARY 20.—The ANNUAL GENERAL MEETING was held in the Royal Irish Academy House, the Vice-President, N. COLGAN, M.R.I.A., in the Chair. The annual report, read by the Hon. Secretary, G. R. HUMPHREYS, showed a membership of 81—a decrease of 15—and gave in other respects a good account of the year's work. Five excursions and six evening meetings had been held and reported in the *Irish Naturalist*. The Hon. Treasurer's statement showed a small balance. Officers for the year were elected as follows:—President, N. COLGAN, M.R.I.A.; Vice-President, Professor G. H. CARPENTER, B.Sc.; Hon. Treasurer, C. J. BATEMAN; Hon. Sec., C. B. MOFFAT. A special vote of thanks was passed to H. G. Cuthbert on his retirement from the office of Hon. Treasurer, held by him for the long period of 17 years.

R. LL. PRAEGER gave an address on the "Distribution of some rare Irish plants." The plants dealt with were chiefly those of the Lusitanian and American groups, and the argument for their antiquity as members of the Irish flora was shown to be strongly based on a discontinuous distribution in Ireland as well as elsewhere. Specimens of the plants discussed were handed round and examined with much interest, and attention was called to the striking difference between the Irish form of "Fox's Cabbage" (*Saxifraga umbrosa*) and the South European form grown in gardens as "London Pride." A discussion followed in which the Chairman, C. B. Moffat, and Professor Carpenter took place. Some Australian plants were afterwards exhibited by Mrs. Long.

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MAJOR G. E. H. BARRETT-HAMILTON,

B.A. (CANTAB.), F.Z.S., M.R.I.A.

It is difficult to contemplate a more severe loss than that which has befallen both Irish and British zoology through the wholly unexpected death of Major G. E. H. Barrett-Hamilton, of Kilmanock, Co. Wexford, which took place in South Georgia Island, on the 17th of last January. The best and most important fruits of his long application to the study of Mammals were only beginning to appear, and a work which should have marked an epoch in British vertebrate zoology has been reduced to the dimensions of a fragment. Though only forty-two (the same age that proved fatal last year to Dr. N. H. Alcock) Barrett-Hamilton had contributed enormously by his scattered writings to the knowledge possessed on this subject by the scientific world ; but those who were looking forward to a collected presentation of this knowledge in the popular form that was promised must feel with peculiar keenness the blow of the gifted author's death.

Irish by parentage, but born in India in 1871, Gerald Edwin Hamilton Barrett was three years old when his parents settled at Kilmanock, which was thenceforth to be his home. His father, Captain Samuel Barrett (who assumed the additional name of Hamilton in 1887) was a son of Hill Hamilton Barrett, of Dublin, and of Sarah, daughter of William Hutcheson, of Woodside, Armagh. His mother was Laura, daughter of Childers H. Thompson, of The Mount, York.

So strong was his early love for nature that bird and flower notes had to be made for him before he was able to write ; and a diary of natural history observations in his own handwriting was begun before he was ten.

In 1885 he went to Harrow School, where his house-master was the late Dr. R. Bosworth Smith, an enthusiastic ornithologist and a great encourager of natural history in the boys under his charge. With him young Barrett-Hamilton formed a lasting friendship, and correspondence between them only ceased with Dr. Smith's death in 1908.

But it was in Ireland that the tastes which were to dominate his life found their most important stimulus. As early as 1886 we find him in active correspondence with A. G. More, to whose ever helpful influence he always admitted that he owed more than to any other source in the guidance of his youthful studies. The environment of his Wexford home had also a great effect on him. His interest was quickly aroused by the discovery that black rats were not uncommon about Kilmanock. Naturally enough (until set right on the subject by More) he supposed them to be the "Old English Black Rats"—late survivors of a species regarded as on the point of extinction. His first note to the *Zoologist*¹—like More's own, which recorded a supposed "Fire-crested Wren"²—was therefore based on a mistaken identification. But from that time onward we may date his special attention to the subject of Thompson's *Mus hibernicus*, which had occupied a strangely ambiguous position for the fifty years that had elapsed since it was first introduced to notice. A few years later, in collaboration with W. Eagle Clarke, he produced the important paper³ which proved the "Irish Black Rat" of Thompson to be a melanistic variation—somewhat more common in the S.E. of Ireland than elsewhere—of the common *Mus decumanus*. One can only guess how far the black rats of Kilmanock contributed towards the concentration of his interest in later years on the Mammals in general, and the Muridae in particular.

But we are anticipating. He was still a Harrow school-boy, whose investigations into Irish natural history had to be limited to the time allowed by school vacations. With A. G. More as his director and referee, he devoted these chiefly to explorations after plants, tracing with special zeal the range of *Cochlearia anglica*, which was found to be unexpectedly prevalent in the estuaries of the Suir and Slaney. He soon had materials for several papers on the flora of his neighbourhood, in which he was ably assisted by his friend and neighbour, Miss Louisa S.

¹ *Zool.*, 1887, p. 426.² *Zool.*, 1849, p. 2526.³ *Zool.*, 1891, p. 1.

Glascott. He was indefatigable in seeking out other correspondents who shared his tastes. Ussher was soon as great an encourager as More. Before leaving Harrow he began (under the name "*Lepus Hibernicus*") to edit a natural history column in the *Irish Sportsman*, and this he continued for several years, while pursuing his undergraduate course at Cambridge. A little book produced by him in 1892 on "*Harrow Birds*" was the subject of the first review that appeared in the newly founded *Irish Naturalist*—written by the friendly hand of A. G. M.

Entering Trinity College, Cambridge, in 1890, Barrett-Hamilton immediately came under the notice of Professor Alfred Newton, who became one of his firmest supporters and more than once stated that he had never met with a young naturalist of greater promise. Another remarkable friendship which he formed at Cambridge was with Edward Adrian Wilson, destined to be the artist in later years of his "*History of British Mammals*," and sadly to perish with the other heroes of Scott's last Antarctic Expedition only a few months before Barrett-Hamilton himself sailed for the far south to a fate as deeply mourned.

After graduating 1st Class in the Natural Science Tripos, 1894, Barrett-Hamilton helped to contribute a new surprise to the zoological world when, in 1895, he and Mr. Oldfield Thomas announced their discovery that the Stoat of Ireland was specifically distinct from that of Great Britain. In the spring of the same year a visit to Morocco attracted him to the study of geographical variation in the House-Mouse, and further stimulated him on the line of research that so strongly characterises his work. Then came his appointment (in 1896) as one of the two British Commissioners on the Bering Sea Fur Seal Commission, which occupied him for the greater part of that and the following year. By his observations on the Fur-Seals of the Pribilof Islands during the two long breeding seasons (1896 and 1897) that he spent among them Barrett-Hamilton revolutionised many of the standard conceptions of the social life of the seal-community, and no writer on the

habits of these animals can now afford to neglect his remarkable record.¹

During the intervals of absence permitted him by the Seals when they quitted their breeding-resorts, Barrett-Hamilton visited Japan, Kamchatka, and various islands of the North Pacific, besides visiting Egypt on one of his journeys home. The results of these excursions are scattered through many journals, for mammals, birds, fishes, and a few insects, as well as plants, formed some of the subjects dealt with, and some observations on the Salmonidae in Kamchatka (where he also made out a new species of Nutcracker) *Nucifraga kamchatkensis*, suggested to his mind a theory as to the origin of secondary sexual characters,² of which he never afterwards quite lost sight. In the Ghizeh museum he inspected what is probably the oldest specimen of ornithological portraiture in the world—the Maydoom fresco, with its figures of six geese, the inspection of which by a competent eye had been pronounced by Professor Newton in his Dictionary of Birds³ to be a much-needed desideratum. The result of Barrett-Hamilton's examination of them appeared in the *Ibis*.⁴

After three years devoted to critical—and, indeed, strenuous—work on European mammals, he was again called from home by the South African War, in which he served (1901–2) as Captain of the 5th Royal Irish Rifles. South Africa had an important influence on the remainder of his life, for after the war he married, in 1903, Maude, the only daughter of F. S. Eland, of Ravenshill, Transvaal.

For the next ten years (1903–13) he lived quietly at Kilmanock, devoting all the time that the busy life of an enterprising agriculturist allowed him to the preparation of his work on British Mammals—a work which he had long had in contemplation, and of which an early hint had

¹ See *Natural Science*, 1899, pp. 17–41.

² See *Proc. Camb. Phil. Soc.*, 1900, p. 279.

³ *Introd.*, p. 2.

⁴ 1897, p. 484.

been dropped in the pages of the *Irish Naturalist*¹ in the course of his review of Lydekker's "Handbook" in the spring of 1895.

It is by what he has given us of this book that Barrett-Hamilton will now be chiefly remembered. It began to appear in parts in October, 1910, and had only reached its fifteenth part when the series was cut short by the author's untimely death. We have, therefore, only the Bats, the Insectivora, and a small number of the Rodents, from which to estimate the merits and value of the work had it been completed by him. It has ceased just as it was nearing the point where the author's greatest qualities would have been called forth in all their strength. He had to trace the past story of the Wild Cat, the Bear, and the Wolf, as well as to solve the ambiguous records of the Squirrel in Ireland and of the "Old English Black Rat" in the British Islands generally. He had to make intelligible to the general reader the fruits of his peculiarly close study of variation—especially geographical variation—among British Mice and Voles, and to give us a comprehensive view of the effect of what Mammals—both living and extinct—tell us regarding the probable past history of these islands. The book would certainly have expanded in his hands to more than three times its present bulk, and would have increased in interest towards the end. But it is impossible to dip into any of the parts already before us without being struck with the extraordinary amount of research that has been bestowed on their preparation.²

In August last the fourteenth part of the "History of British Mammals" appeared with a touching obituary notice—doubly touching when re-read six months later—of the gifted artist of the work, Edward Adrian Wilson.

The careers of the two men—the writer and the subject of the notice—had been curiously interwoven. "Author and artist"—as Barrett-Hamilton says in his appreciation—"had at Cambridge attended the same lectures, frequented the same laboratories, and finished equal in

¹ vol. iv., p. 92.

² The publishers announce that Mr. M. C. Hinton of the British Museum has undertaken to complete the work.

the Tripos of 1894. Both were candidates to the scientific staff of Scott's first Antarctic Expedition (1901-4) for which one alone could be appointed. To the rejected applicant fell the consolation of compiling for the use of his successful rival the chapter on seals in the Antarctic Manual (1901)." One stage was yet to be added to complete the parallel.

In October, Barrett-Hamilton sailed for the Southern Ocean, having been appointed as commissioner from the Colonial Office and the Natural History Museum to report on questions arising out of the indiscriminate slaughter of whales in the seas round the Falkland Islands and South Georgia. While discharging the duties of this appointment on the last-named island he was attacked by pneumonia, and died on the 17th of January, 1914. His remains were brought home and laid to rest in the churchyard of Duncannon, Co. Wexford, on Monday, the 2nd of March.

Of his personal qualities this is scarcely the place to speak, but it is not an exaggeration to say that he leaves a gap which will ever remain in the hearts of those who knew him. His keen interest in sport, agriculture, politics, &c., made his circle of acquaintances very wide, even apart from his devotion to natural science, on which, of course, his correspondence was most extensive. The charm of his manner was as strongly brought out in his letters as in his conversation, and no one was ever readier to accept a little criticism in the best possible spirit, or to indicate where full information on a particular subject was to be obtained. He had a decided power of interesting popular audiences on natural history subjects, as will be remembered by those who attended the afternoon lectures he occasionally delivered for the Royal Dublin Society, on subjects that ranged from the Seals of the Pribilofs to the Bats of the British Isles.

Of the value of his many scattered zoological writings there may, of course, be two views—especially as regards some of the latest, in which his genius for "splitting" proved a stumbling-block to a certain school of thought. Some of the best known of his papers were written in early

years, and two of these (that on Sabine's Snipe¹ and on the Introduction of the Magpie into Ireland²) were of sufficient importance to be cited by Professor Newton in his Dictionary of Birds; while those on the Irish Black Rat³ and Irish Stoat⁴—in which, however, he had the co-operation respectively of Messrs. W. Eagle Clarke and Oldfield Thomas—possess an interest and authority that cannot be ignored. His contribution to the Clare Island Survey series⁵ is also a paper deserving close study; and in some of his short notes isolated facts are brought to notice (such, for instance, as the coincidence of the Wexford and Pembrokeshire local names of the Corncrake⁶) that might otherwise long have escaped attention among those whom they would specially interest.

Of the enormous number of subspecies that he has added to the list of European, Asiatic, and African mammals it may suffice to say that no man could be more willing than Barrett-Hamilton himself to admit that the amount of meaning which underlies his distinctions is open to the widest range of interpretation. He brought out his own point of view clearly and well in his reply⁷ to some strictures from Dr. Lönnberg, of Upsala, who objected to his "splits" among the Hedgehogs and Weasels. "Even if I were to find that I had made numerous bad subspecies I would vastly prefer to be on the side of those who attempt to unravel the mysteries of variation . . . rather than to cultivate the icy scepticism of the modern school of lumpers, to whom the many phases of animal variation are like the ripples of the ocean to the navigator—things to be detested in proportion as their magnitude makes them troublesome." He did not care whether his splits were called subspecies, races, or phases, but insisted that they were, in any case, worth tracing out and recording. Be this as it may, it was an inestimable boon to the student of Irish zoology that the writing of what was to be the

¹ *Irish Nat.*, 1895, p. 12.

⁴ *Zool.*, 1895, p. 124.

² *Zool.*, 1891, p. 247..

⁵ *Proc. R.I. Acad.*, vol. xxxi., pt. 17.

³ *Zool.*, 1891, p. 1.

⁶ *Zool.*, 1909, p. 30.

⁷ *Ann. & Mag. Nat. Hist.* (7) vol. vi., pp. 244-5.

new standard work on British Mammals should have been entrusted, by common consent, to one who added to all his other high qualifications for the task that of having from his earliest years had his interest specially centred on the fauna of Ireland. From this point of view his loss is irreparable. Whoever may be found to complete the work begun by Barrett-Hamilton, he cannot bring to the task the special knowledge Barrett-Hamilton possessed of the animal life and local legends and literature of this western island, and it is unnecessary to add that this is a loss not only to Ireland but to Europe at large.

C. B. MOFFAT.

LIST OF THE SCIENTIFIC WRITINGS OF G. E. H. BARRETT-HAMILTON.

- 1887.—*Carex Boenninghausenia* in Co. Wexford. *Journ. Bot.*, vol. xxv. p. 348.
 „ *Clinopodium vulgare* in Co. Wexford. *t.c.*, p. 248.
 „ Black Rat in Co. Wexford. *Zool.* (3), vol. xi., p. 426.
- 1888.—Jay and Squirrel in Co. Wexford. *Zool.* (3), vol. xii., p. 67.
 „ Starling in Ireland. *t.c.*, p. 106.
 „ Hybrid Rats (supposed). *t.c.*, pp. 141-2.
 „ Tree Sparrow breeding at Harrow. *t.c.*, p. 353.
 „ Golden Oriole at Harrow. *t.c.*, p. 393.
- 1889.—(With Miss L. S. GLASCOTT). Plants found near New Ross, Ireland. *Journ. Bot.*, vol. xxvii., pp. 4-8.
 „ (with W. EAGLE CLARKE). The so-called *Mus hibernicus*. *Zool.* (3), vol. xiii., p. 381.
 „ Ornithological Notes from Co. Wexford. *t.c.* pp. 144-5.
 „ Woodcocks in Ireland. *t.c.*, p. 233.
- 1890.—(with Miss L. S. GLASCOTT). Plants found near Kilmanock, Co. Wexford. *Journ. Bot.*, vol. xxviii., pp. 87-9.
 „ Bottle-nosed Whale in Wexford and Wicklow. *Zool.* (3), vol. xiv. p. 72.
 „ Sperm Whale in Mayo. *t.c.*, p. 72.
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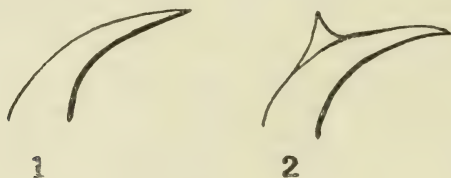
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A TERATOLOGICAL SPECIMEN OF MYRMICA RUBRA.

BY REV. W. F. JOHNSON, M.A., F.E.S.

Among some specimens of the above ant, which is the common little red ant so often found under stones, I have found a worker which has a most curious development of the propodeal or epinotal spines. These spines are two in number and project from the hinder part of the thorax backwards over the petiole or waist of the insect. They are usually curved and tapering to a point without any break in their outline (fig. 1). In this particular specimen the left-hand spine (looking at the insect from the front) has about midway of its length a small thorn-like projection at right angles to the spine. This little pro-



jection is not as long as the remainder of the spine and presents a very remarkable appearance (fig. 2). I have never before met with anything of the sort, and on consulting Mr. H. St. J. K. Donisthorpe, F.E.S., who has given a great deal of attention to ants, he kindly informs me that he has never seen such a development of the spine though he has seen the spines of different lengths or blunted. He suggests that the cause of this abnormal growth was some injury to the larva or pupa. The specimen belongs to the race *ruginodis* of *M. rubra*. It was taken by me on Clare Island in June, 1911.

Poyntzpass.

THE BRITISH FORMS OF HELOSCIADIUM.

BY THE REV. H. J. RIDDELSDELL.

[Largely based on a paper read before the Cotteswold Club, at Gloucester, 17th March, 1914, from which the quotations, below unacknowledged, are taken.]

Since writing a paper on *Helosciadium* forms, in conjunction with Mr. E. G. Baker, for the *Journal of Botany* (1906, p. 185), I have devoted a good deal of time to the genus. At the present moment, as a large number of specimens are at my disposal, through the kindness of Messrs. Bailey, Hanbury, Praeger, Druce, and other botanists, it seems opportune to put together and make public some of the conclusions to which my further studies, in the field and in the herbarium, point. The conclusions are, some of them, final, some tentative: some of them must be tested by cultivation of forms, especially in the case of *H. nodiflorum* and *H. repens*. What is here said can therefore, in some cases, be only regarded as a stage on the way to further investigation: but all of it seems likely to have a value in that direction, and it is better therefore to publish it as a whole.

H. NODIFLORUM, Koch.

1. *Habitat*: varies greatly, within certain limits. "It is always a plant of watery places, though its foliage and inflorescence are almost always raised above the surface of the water." Its most characteristic spot is some deepish, rather shaded ditch, which normally has some small depth of water: but almost any fresh-watery spot will do; "rough, swampy ground, either shaded or occupied by a good deal of varied low-growing vegetation; muddy margins of ponds; parts of grassy or heathy hillsides, which are wet in winter and dry in summer; the damper parts of the flat, sandy ground behind dunes, which completely dry up in summer, though they are under water at other seasons. Its roots are probably always within easy reach of water." It thrives in competition with other species.

2. *Forms*.—The forms are numerous and puzzling. Mr. Baker and I (*loc. cit.*) described as varieties, *vulgare*, F. Schultz ; *ochreatum*, DC. ; *pseudo-repens*, H. C. Watson ; *longipedunculatum*, F. Schultz ; *repens*, Koch. But now certain conclusions have at length ripened in my mind, which are rather at variance with that arrangement. The first is that these varieties “represent only a few out of numerous forms, all equally capable of description, which the plant assumes. The varieties named happen to have been pitched on by collectors in past years, and described ; and so they have got into our hand-books. They represent, in fact, certain stages, or steps, or extremes, of variation in a few directions, but leave the student uninformed of the large variety of directions and degrees in which the species varies. The number of characters in which variation occurs is of course great ; *e.g.*, size of plant, vigour, compactness, production of roots or rootlets at the nodes, direction of stems or branches (*i.e.*, prostrate, ascending, &c.), shape and number of leaflets, length of peduncle, presence and number of involucre-bracts, number of rays in umbel, and so on. The degree of variation in each of these characters, again, differs considerably. Now, it is a fact that a large number of the possible combinations of these variations of character may be found in a long series of specimens” ; and to describe and name every distinct form would be a very large undertaking.

A second conclusion is this : that there are often found “upon one plant, springing from one root, more than one of these distinct forms.” To take the rooting-character as an example. “*H. nodiflorum* normally consists of a root, from which a more or less upright flowering stem proceeds ; and there are numerous nearly prostrate side stems or branches from the root, each of which may both flower and root.” “The rooting character may be present in all the side stems, of course at the nodes only ; even if for any reason the stems or branches are not actually prostrate, if *e.g.*, they are carried up a hedge, or held up among herbage, they often show little embryo roots or processes which in contact with the ground might develop

their true character. It is quite common for the signs of rooting to extend to the end of the branch, though apparently sometimes with omissions in the middle. But sometimes these side stems, even if prostrate on bare ground, show no evidence of the rooting character. Again, on different flowering branches of one and the same plant the rooting character is strongly present, and nearly absent." "At one time, I thought the rooting character a means of diagnosing the soil rather than the variety of *H. nodiflorum*; but that opinion now appears to me at variance with actual facts. It seems impossible at present to explain the variations of this feature.

Other characters, *e.g.*, length of peduncle, shape of leaflet, are as untrustworthy as that of rooting, for purposes of critical diagnosis. The form taken by the species is very largely determined by the surrounding vegetation, and by the amount of water present. It is a common thing to find the same series, or even the same plant, changing suddenly from the small- or medium- leafed form, with its compact foliage and low growth, as it runs among the open grass by a tiny rill, to the large ditch-form, with its tufts of great upright leaves, and large coarse stems and branches; the change being due only to the shade of a copse or bramble."

Again, where large plants of *vulgare* have been broken off short during the summer, if the water has (as in 1911 and 1913) receded, and left the plants on mud, the later growth from the same roots takes the form of a small, compact plant, rooting at the joints, which would have to be placed very close to *pseudo-repens*, H. C. Watson. The circumstances have changed, at least in one vital respect, and the plant has changed with them.

From this is derived, with some hesitation, a third conclusion, which needs, especially in some directions, to be submitted to the test of cultivation. "Some of the supposed varieties at any rate are simply transient forms due to special circumstances": though I think there is at least one exception. "My belief is that almost all the named varieties of *H. nodiflorum* are simply states due to difference of soil, water supply, and cover. They

should therefore be altogether excluded from our British lists," or if mentioned should be given their true status.

The one exception referred to is var. *longipedunculatum*, F. Schultz, the best known localities for which are Gullane Links, Haddingtonshire, and Duddingston Loch, Midlothian. Herbaria contain a good many instances of it, more or less disguised, from scattered localities ; but I believe that, in spite of their disguise, they are all forms of one thing, again varying with the surroundings. The most interesting fact here relevant is that it sometimes closely simulates *H. repens*, Koch. Botanists often apply this latter name to a compact, strongly rooting form of *H. nodiflorum* type which bears no resemblance to *H. repens* ; less often but far more excusably, to a form of var. *longipedunculatum* which is very much like *H. repens*. For in exposed parts of some of the localities where this variety grows, say, in muddy spots, or in the more central parts of shallow pools (as at Gullane), it assumes a form which I will venture to call f. *simulans* (valde simulat *H. repens*, involucrem autem, et foliolos, et fructum var. *longipedunculati* habet ; necnon in horto culta vertitur in var. *longipedunculatum*). This form corresponds in essentials to the variety, but is small, prostrate, and rooting ; its habit very strongly resembles that of *H. repens*, but it goes off by degrees to the ordinary form of the variety, as is shown by a study of all the available material from Gullane. The variety, indeed, behaves just as does type *nodiflorum*, varying under the influence of its surroundings, even to the extent of producing more than one form from the same root (see M. Cowan in B.E.C. Report, 1910, p. 564-5). And f. *simulans* from Port Meadow was grown on in a garden, and produced var. *longipedunculatum*.

The localities to which I am able to trace the variety in its different shapes are :—

OXON. (Port Meadow and Binsey Meadows, Hb. Druce).

CAMBS. (Sturbridge Fair Green, and Upware, Hb. Babington ; and Haddingham sp. comm. Prof. Glück.)

SUFFOLK (Bungay, Hb. Kew; Bradwell, Hb. H. C. Watson).

NORFOLK (Fakenham, Hb. Bailey).

NORTHANTS, (Foxhall, Hb. Druce).

CHESHIRE (Nantwich, Hb. Bailey).

HADDINGTON (Guillon = Gullane = N. Berwick = Luffness).

MIDLOTHIAN (Duddingston Loch).

H. REPENS, Koch.

Differs from all forms of *H. nodiflorum*, including the last-mentioned, in its fruit. The fruit of *H. repens* is broader than long, smaller than in the other species, a pretty chestnut all over, even on the ridges, and nearly the same colour even in internal section. The faces of the fruit are puckered into false ridges, situated midway between the true ridges; there seem thus to be ten ridges in all, five rather more marked than the rest. But the fruit of the commoner species is longer than broad, very dark brown to black, with five light-coloured prominent ridges. *H. repens* is a good species, for it not only has this most important fruit-character, but it is apparently far more stable in form than *H. nodiflorum* and its variety, if I may judge from a good series of continental specimens; the number and shape of leaflets, the constancy and size of the involucre, again mark it off, though, in any doubtful case, a good series of sufficient specimens is necessary before a definite judgment can be passed.

Recently, through the kindness of Mr. Webster, of York, I have had the pleasure of finally confirming the occurrence of *H. repens* in Britain. Some specimens of his from Skipwith, Yorks, had the characteristic *H. repens* fruit—the first I have seen from a British gathering. The same species may occur in Oxon (Port Meadow, &c.), and at Kinghorn Loch, Fife (coll. Syme, 1870, in Hb. Hanbury). The Fifeshire plant looks more like *H. repens* than that from Oxford, but in both the fruit is wanting; and I should hesitate to make a final decision without this important evidence, unless the plants were tested by cultivation.

H. INUNDATUM, Koch.

A variety which I do not find in English manuals is var. *fluitans*, Fr., Novit. Fl. Suec., p. 182 (1832-42). It is simply the type plant with *all* its leaves divided into capillary segments. There is a specimen in the British Museum named by Fries himself, and I have therefore no hesitation in placing to this variety plants from E. and W. Gloster (Canal at Sapperton and Cirencester), and Isle of Wight (Hb. Bailey); from Connor Hill, Kerry (1853, coll. D. Oliver); R. Maam, Galway (Hb. W. A. Shoolbred), R. Clare, at Tuam, Galway (Hb. Praeger). Mr. Bailey has also specimens from Cumberland and Connemara which must be placed under the variety. As however, intermediates occur in Gloster between the type and the variety, it may be doubtful whether var. *fluitans*, Fr., is really anything better than a "state."

Resuming the conclusions of my paper on *Helosciadium Moorei* (*Irish Nat.*, Jan., 1914), I venture to rearrange the British forms of *Helosciadium* on the following lines:—

Helosciadium nodiflorum, Koch.

f. vulgare.

f. ochreatum.

f. pseudo-repens.

var. longipedunculatum, F. Schultz.

f. simulans.

H. repens, Koch.

× *H. Moorei* Riddelsdell (*inundatum* × *nodiflorum*).

f. subnodiflorum (*f.* quae potius *H. nodiflorum* simulat quam *H. inundatum*, foliolis minus tenuiter dissectis).

f. subinundatum (forma plerumque elatior, foliolis inferioribus tenuiter dissectis, caule teneri, etc.; simulans *H. inundatum*).

H. inundatum, Koch.

var. fluitans, Fr.

As *Helosciadium* is usually grouped in this country under *Apium*, it is as well to publish the same list under that

generic name, so that the responsibility for the arrangement may in both cases be traced to the right quarter.

Apium nodiflorum, *Reichb. fil.*

f. vulgare.

f. ochreatum.

f. pseudo-repens.

var. longipedunculatum, *F. Schultz.*

f. simulans.

A. repens, *Reichb.*

× *A. Moorei*, *Riddelsdell.*

f. subnodiflorum.

f. subinundatum.

A. inundatum, *Reichb. fil.*

var. fluitans, *Fr.*

Old Registry, Llandaff.

REVIEW.

BLUE-GREEN ALGAE.

Notes on the Blue-Green Algae. With a key to the species of *Oscillatoria* and *Phormidium*. By HAROLD WAGER, F.R.S. Pp. 48. London, Hull, and York: A. Brown & Sons, 1914. Price, 2s. 6d.

Students of this interesting group of algae have placed before them a useful guide by the publication of the "Notes" by H. Wager, whose cytological work on the group is well known. As the guide is mainly intended to aid the preliminary identification of the species of the two genera *Oscillatoria* and *Phormidium* it may seem out of place to regret the omission, from the account given of the life-history of the group, of the movements of *Oscillatoria*, etc., of the ecological features of the group (*e.g.* that *O. tenuis*, var. *natans*, is at first a member of the benthos and later of the plankton); and of the economic importance of the group (*e.g.*, relation to drinking water). The price (2s. 6d.) seems high for a book of 48 pages, without illustrations even, to students to whom the larger illustrated works quoted are not available. Gomont's Monograph is twice mentioned without the accent in *Oscillariées*, one of few errors in an otherwise well-produced key.

Ireland is a most promising and neglected field for the study of the forms described in this encouraging book.

T. J.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Rhesus Monkey from Mr. F. G. Brien, a Lemur from Lady Waterford, a pair of Siamese Cats from Mrs. Thorneley, a Leopard from Mr. T. A. Finch, a Badger from Mr. J. H. McConnell, Rabbits from Mrs. Duggan, Mrs. Whelan, Messrs. B. Scott, L. West, and Freeman; Rose-tinted and Silky Starlings and Chinese Mynahs from Messrs. Cross, a Mannikin and three Weaver Birds from Mr. Geo. Low, an Amazon Parrot from Mr. J. T. Bernard, a Grass Parrakeet from Mr. T. C. Dickie, a pair of Wood Pigeons from Mr. A. H. R. Sproule, a Merlin from Dr. Cecil Digby, a Geometric Tortoise, some Edible Frogs, Green Tree Frogs, Fire-bellied Toads, and Natterjack Toads from Prof. J. Bayley Butler, several thousands of Salmon and Trout ova from the Irish Fisheries Office, and Trout ova from Col. Claude Cane.

A young female Gorilla, two young male Chimpanzees, a Grivet Monkey, a Marmoset, a pair of Ravens, a pair of Half-moon Conures, a Reeves Pheasant, and a Swan have been bought. Six Dingo puppies and a Wombat have been born in the Gardens.

At present the centre of attraction in the Monkey-house which contains an exceptionally interesting set of Anthropoid Apes, a Gorilla, three Chimpanzees, and an Orang-utan. The Fish-hatchery also, where there are thousands of Salmon and Trout larvae, is well worth a visit.

BELFAST NATURALISTS' FIELD CLUB.

FEBRUARY 11.—GEOLOGICAL SECTION.—At this meeting a number of interesting specimens were brought together for exhibit and discussion. ROBERT BELL exhibited haematite, beautifully encrusted with clear quartz crystals, obtained from trial borings on Slieve Gallion, County Tyrone. Miss M. K. ANDREWS showed a number of micro-sections of local rocks. Miss BLACKWOOD, specimens of marbles, &c., from Italy. Dr. DWERRYHOUSE, erratics from the Glacial drift of the neighbourhood of Belfast. S. WEIR, fish remains from the Old Red Sandstone of Cromarty, plant remains from the Coal-measures near Glasgow, and fossils from the indurated Lias at Portrush. ROBERT MAY showed a number of interesting things, including a polished slab of altered limestone from Cave Hill, which might easily have been mistaken for one of the expensive Italian marbles. Among the exhibits was a coloured diagram showing a typical section of County Antrim, such as might occur in the neighbourhood of Cave Hill. This was prepared by WILLIAM GRAY, M.R.I.A. It showed clearly the talus slope beneath the basaltic escarpment resting on Lias clay, the cause of many landslides, picturesque and otherwise, in County Antrim. After the exhibits had been examined and discussed, S. Weir officiated at the lantern, and views of geological interest by various members of the section, were thrown on the screen.

DUBLIN NATURALISTS' FIELD CLUB.

FEBRUARY 11.—N. COLGAN (President) in the chair. A number of natural history specimens were exhibited, including the African Dragon-fly *Hemianax ephiphiger*, caught in Herbert Park in October last, shown by J. N. Halbert. The President read a paper—"Field Notes on the Folk Lore of Irish Plants and Animals." This paper, which broke new ground for the Field Club and was listened to with the deepest interest, appeared in the last number of the *Irish Naturalist*. In the discussion that followed W. F. Gunn, R. Ll. Praeger, Miss E. White, H. W. D. Dunlop, and C. B. Moffat (Hon. Sec.), took part.

NOTES.**ZOOLOGY.****Trout and Bumble Bees.**

Mr. F. B. Hinchliff, of Instow, North Devon, writes in the *Field* of December 27, 1913 :—"While dry-fly fishing on a lake in the west of Ireland last September, I killed a Brown Trout weighing 2lb. 2oz. on a black gnat, these insects being fairly plentiful on the water at the time; and on examining the contents of its stomach I was surprised to find that it contained, besides other food, five bumble bees—two large females and three males. Now, I had noticed a good many of these bees on the water in the morning, and, when the fish came on the feed in the afternoon at the black gnat, I noticed that every now and then a fish would make an extra large boil at something, and I could not understand the reason why. But after finding these five bees in the stomach of the only trout I killed that day, I came to the conclusion that the bees were probably responsible for the very large and rather splashing boils. Although this is the first time that I have found trout actually taking bumble bees, yet I have often seen trout boil at, without taking, them. And I always thought that the reason was that in their younger days they had probably been stung, and consequently did not wish to repeat the unpleasant dose. As trout usually swallow insects alive, it seems to me incredible that one, at least, of these five bees had not stung the trout internally; but perhaps fish are impervious to stings. I remember once killing a trout of 4½lb. on the same lake before lunch, and on examining its stomach about seven o'clock the same evening, I found that it contained about 300 red ants, one beetle, and a common honey bee. These I spread out on a sheet of paper in the sitting-room, where there was a fire, intending to count them, but dinner was announced, so I postponed the counting until after the meal, when to my surprise I found the insects crawling all over the place, the heat of the room apparently having helped them recover consciousness. And practically every one of them recovered although most of these had been imprisoned in the stomach of the trout

for about seven or eight hours. So that, with reference to the first mentioned fish, one might reasonably draw the conclusion that these five bumble bees lived for some time in the interior apartments of the trout, and so had ample opportunities of stinging him."

Waxwing in Co. Armagh.

A female Waxwing (*Ampelis garrulus*) shot in a field at Tanaghmore North, near Lurgan, co. Armagh, on January 2nd, 1914, has been presented to the Dublin Museum by Dr. J. Singleton Darling; it had been feeding largely on the fruit of the wild rose. Five Waxwings have now been recorded this winter from the North of Ireland—one from each of the five counties Londonderry, Tyrone, Down, Fermanagh, and Armagh (*Irish Naturalist*, March, 1914, and *British Birds*, March, 1914).

A. R. NICHOLS.

National Museum, Dublin.

Hawfinch at Balbriggan.

On the 14th February a working man brought me a male Hawfinch, which had been killed the night before by flying against the canvas on the hoarding round the grounds of the Coursing Club here. Although I have seen small flocks of these birds in the Phoenix Park, when in company with Mr. Godden, the Park Ranger, they were so shy that we could not get near them. Once only have I had a satisfactory view of this bird, and that opposite the "Yellow House," at Rathfarnham.

CHARLES W. BENSON.

Balbriggan, Co. Dublin.

Recent Notices of Irish Birds.

In the *Zoologist* for July, R. Warren notes the usual spring visit of White Wagtails to Bartragh Island, Mayo, and records a Squacco Heron shot in the preceding May near Skibbereen, Co. Cork. In the same journal for September, Prof. Patten publishes an article on the Asiatic Skylark from the Tuskar. In *British Birds* for December, G. R. Humphreys publishes the paper on the Roseate Tern breeding in Ireland, which he also contributed to these pages. Miss Best and Miss Haviland publish notes on migrants in Rathlin Island (which appeared in enlarged form in our January issue), and Dr. Benson has a note on Turtle-Doves at Balbriggan, Co. Dublin. In *British Birds* for November, R. M. Barrington publishes captures of the Tree-Pipit and Pied Flycatcher at Rockabill, and of Little Auks in August in Donegal and Kerry.

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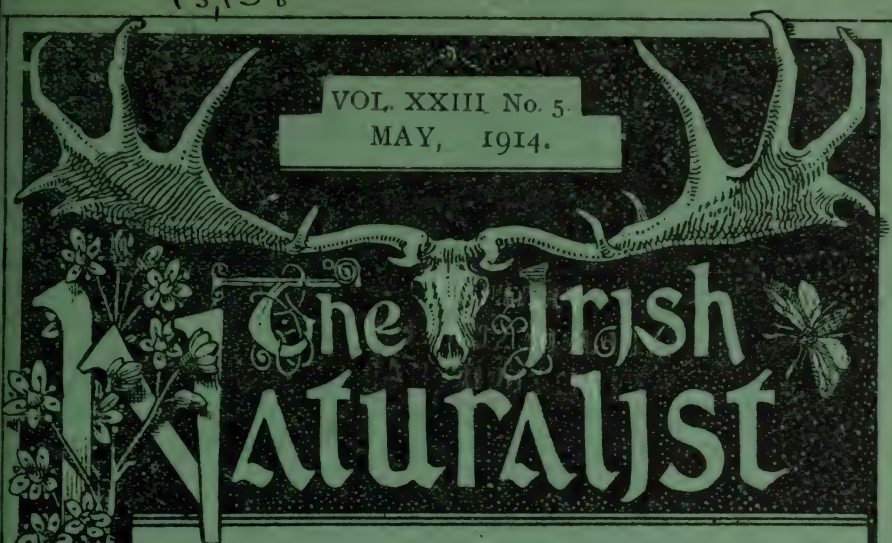
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COLEOPTERA FROM THE SOUTH WEST OF IRELAND.

BY EDWIN BULLOCK.

Being a resident in Killarney for the last two or three years I have had great opportunities for collecting Coleoptera in Kerry. This part of Ireland which abounds in such excellent natural habitats for insects having only been worked hitherto by naturalists paying short visits, it is not surprising that many species have for long escaped notice. In the appended list of three hundred or more, twenty-three have apparently not been previously recorded from Ireland. They are :—

<i>Lebia crux-minor</i> L.	<i>Bibliporus bicolor</i> Denny.
<i>Callicerus rigidicornis</i> Er.	<i>Euplectus aubeanus</i> Reich.
<i>Homalota aequata</i> Er.	<i>E. piceus</i> Mots.
<i>H. linearis</i> Grav.	<i>Cephennium thoracicum</i> Müll.
<i>Agaricohara laevis</i> Kr.	<i>Agathidium seminulum</i> L.
<i>Myllaena infuscata</i> Matth.	<i>Cerylon ferrugineum</i> Steph.
<i>Stenus argus</i> Grav.	<i>Rhizophagus bipustulatus</i> Fab. ath.
<i>Acrulia inflata</i> Gyll.	<i>Leptidia brevipennis</i> Muls.
<i>Megarthus affinis</i> Mill.	<i>Phyllobius urticae</i> DeG.
<i>Bythinus Curtisi</i> Denny.	<i>Hypera alternans</i> Steph.
<i>B. securiger</i> Reich.	<i>Rhinoncus gramineus</i> Herbst.
<i>B. Burrelli</i> Denny.	

Lebia crux-minor, the most interesting beetle in the list, I found crawling on a pathway in the Muckross demesne. Though I have examined carefully the surrounding woods, rotten stumps of trees, faggots, &c., I have not as yet been successful in finding more specimens. This rare beetle will, no doubt, be discovered in other parts of the west.

The only interesting Longicornia I have met with in the Kerry district are *Leptidia brevipennis* and *Callidium violaceum*, which I secured by sweeping Hawthorn flowers. The latter has been previously recorded by Mr. Bouskell, who found it under the bark of fir trees at Caragh Lake, Co. Kerry. Special attention given to the family Pselaphidae

by the careful examination of moss from selected localities, bark, garden refuse, &c., resulted in the discovery of no less than six additional Irish species. Some of the others are interesting from a distributional point of view, such as *Melolontha hippocastani*, &c.

I must thank Mr. G. C. Champion, F.Z.S., for kindly naming all critical species for me, and Mr. J. N. Halbert for much useful assistance.

LIST OF SPECIES.

Carabus glabratus Payk.—Purple Mt., Killarney.

C. clathratus L.—Bull Mt., Killarney.

Leistus ferrugineus L.—Mangerton.

Nebria Gyllenhali Sch.—Common on the Killarney mountains.

Pelophila borealis Payk.—Common on wet and boggy lake shores, Killarney.

Blethisa multipunctata L.—Less common than *Pelophila* in the same locality.

Elaphrus uliginosus F.—A few specimens from a small lake-shore in the Gap of Dunloe.

Badister sodalis Duft.—Banks of the Shannon close to Limerick, also Killarney.

Chlœnius nigricornis F.—Killarney.

C. holosericeus F.—A single specimen, lake-shore in Gap of Dunloe.

Bradycellus placidus Gyll.—Shannon banks, Limerick.

Pterostichus gracilis Dej.—Killarney.

P. minor, Gyll.—Killarney.

Amara fulva Dej.—Youghal, Co. Cork.

A. similata Gyll.—Killarney.

A. lunicollis Schiod.—Killarney.

Calathus flavipes Fourc.—Youghal, Co. Cork.

C. melanocephalus v. *nubigena* Hal.—Killarney mountains.

Anehomenus angusticollis F.—Banks of Shannon, Limerick.

A. oblongus Sturm.—Very common in damp places around Killarney.

A. atratus Duft.—Limerick; also Killarney.

A. micans Nic.—Very common on banks of the Shannon around Limerick; a few specimens also at Killarney.

A. piceus L.—Very common in Killarney district.

Bembidium quinquestriatum Gyll.—Cork, rare.

B. doris, Panz.—Killarney, moderately common in damp places.

B. affine Steph.—Youghal, Co. Cork, rare.

B. monticola Sturm.—Quite common on lake shores, Killarney.

B. varium Ol.—Youghal, Co. Cork.

Trechus rubens F.—Gap of Dunloe, Killarney.

- Lebia crux-minor** L.—This interesting insect was found crawling on a foot-path near Muckcross, Killarney.
- Dromius meridionalis** Dej.—Cork, also at Killarney.
- Ilybius ater** De G.—Killarney.
- I. obscurus** Marsh.—Limerick.
- I. aenescens** Thoms.—Killarney.
- Rhantus exoletus** Forst.—Killarney.
- Orectochilus villosus** Mull.—Common under stones near small lakes in the Gap of Dunloe, Killarney.
- Paracymus nigroaeneus** Sahl.—Killarney.
- Philydrus nigricans** Zett.—Common under stones near small lakes in the Gap of Dunloe, Killarney.
- P. coaretatus**, Gredl.—Killarney.
- Chaetarthria seminulum** Herbst.—Killarney.
- Hydrochus angustatus** Germ.—Limerick.
- Cercyon obsoletus** Gyll.—Killarney.
- C. quisquilius** L.—Killarney.
- C. nigriceps** Marsh.—Killarney.
- C. terminatus** Marsh.—Killarney.
- Aleochara brevipennis** Grav.—Killarney.
- Ocyusa incrassata** Kr.—Killarney.
- Oxypoda alternans** Grav.—Killarney, in fungi.
- Phloeopora reptans** Grav.—Common under bark, Killarney.
- Ilyobates nigricollis** Payk. } Killarney, found in company with ants.
- Myrmedonia limbata** Payk. }
- M. collaris** Payk.—Killarney, in moss.
- Calodera aethiops** Grav.—Killarney, in moss, common.
- Callicerus obscurus** Grav.—Killarney.
- C. rigidicornis** Er.—Killarney.
- Homalota currax** Kr.—Cork.
- H. pavens** Er.—Killarney.
- H. gregaria** Er.—Killarney.
- H. luridipennis** Mann.—Killarney.
- H. elongatula** Grav.—Killarney.
- H. graminicola** Gyll.—Killarney.
- H. aequata** Er.—Killarney and district, moderately common under wet bark.
- H. linearis** Grav.—Killarney.
- H. elegantula** Bris.—Killarney.
- H. cuspidata** Er.—Killarney, moderately common under bark.
- H. eremita** Rye.—Mangerton.
- H. gemina**, Er.—Killarney.
- H. exilis** Er.—Killarney.
- H. hepatica** Er.—Killarney.
- H. trinotata** Kr.—Killarney.
- H. fungicola** Thoms.—Killarney.
- H. palustris** Kies.—Killarney.
- H. pygmaea** Grav.—Killarney.

- Homalota fungi* var. *clientula* Er.—Killarney.
Gnypeta labilis Er.—Killarney.
Autalia rivularis Grav.—Killarney.
Encephalus complicans Westw.—Limerick ; also Killarney.
Agaricochara laevicollis Kr.—Killarney, in fungi.
Leptusa fumida Er.—Killarney.
Oligota pusillima Grav.—Killarney, in moss.
O. punctulata Heer.—Killarney, garden refuse.
Myllaena dubia Grav.—Killarney.
M. infuscata Matth.—Killarney, in moss.
Conosoma pubescens Grav.—Kilrush, Co. Clare ; also Killarney.
C. pedicularium Grav.—Killarney, common in lakeside moss.
Tachyporus obtusus L.—Kilrush, Co. Clare.
T. formosus Matth.—Kilrush, Co. Clare ; also Killarney.
Cilea silphoides L.—Killarney.
Tachinus humeralis Grav.—Killarney, common in fungi.
Bolitobius trinitatus Er.—Killarney.
B. exoletus Er.—Killarney.
B. pygmaeus F.—Killarney.
Mycetoporus lepidus Grav.—Killarney.
M. splendidus Grav.—Killarney.
Quedius umbrinus Er.—Killarney.
Ocypus compressus Marsh.—Killarney, moderately common.
Philonthus carbonarius Gyll.—Killarney.
P. conceinnus Grav.—Killarney, common in garden refuse.
P. cruentatus Gmel.—Killarney.
P. longicornis Steph.—Killarney.
P. nigrita Nord.—Killarney.
P. fumarius Grav.—Killarney, local on lake shores.
P. micans Grav.—Killarney, common on lake shores.
P. trossulus Nord.—Killarney.
Cafius fucicola Curt.—Kilrush, Co. Clare, common in seaweed.
Actobius cinerascens Grav.—Killarney.
Xantholinus fulgidus F.—Cork.
X. ochraceus Gyll.—Killarney.
Lathrobium elongatum var. *fraudulentum* L.—Killarney, not rare under stones and rubbish.
L. punctatum Zett.—Killarney, rather common on lake shores.
L. filiforme Grav.—Killarney, not common.
L. quadratum Payk.—Killarney, common.
L. terminatum Grav.—Killarney, rather rare.
 var. *immaculatum* Fowler.—Common.
L. multipunctatum Grav.—Killarney, rare.
Cryptobium fracticorne Payk.—Killarney.
Medon melanocephalus F.—Kilrush, Co. Clare.
Paederus riparius L.—Shannon banks, Limerick.
Evaesthetus ruficapillus Lac.—Common in moss, Killarney.
E. laeviusculus Mann.—Killarney, in moss, less common.

- Dianous coerulescens** Gyll.—Cork and Killarney.
Stenus guttula Müll.—Killarney, common.
S. Guynemeri Duv.—Killarney.
S. melanopus Marsh.—Limerick, Cork, Killarney.
S. nitens Steph.—Killarney.
S. fuscipes Grav.—Killarney.
S. vafellus Er.—Killarney, common on lake shores.
S. crassus Steph.—Killarney, not rare.
 var. **littoralis** Thoms.—Killarney, rare.
S. argus Grav.—Limerick.
S. ossium Steph.—Killarney.
S. flavipes Steph.—Limerick.
S. bifoveolatus Gyll.—Killarney, not rare.
S. cicindeloides Grav.—Killarney.
S. paganus Er.—Killarney.
S. latifrons Er.—Killarney.
Haploderus coelatus Grav.—Castletown Bere, Co. Cork.
Trogoploeus arcuatus Steph.—Killarney.
T. elongatulus Er.—Killarney.
T. corticinus Grav.—Killarney.
Syntomium aeneum Müll.—Killarney, under bark, rare.
Lesteva longelytrata Goeze.—Killarney.
L. pubescens Mann.—Killarney, under small waterfalls.
Olophrum piceum Gyll.—Killarney.
Lathrimaëum unicolor Steph.—Killarney.
Coryphium angusticollis Steph.—Killarney.
Omalius pusillum Grav.—Killarney, common under bark.
O. punctipenne Thoms.—Killarney, rare.
O. vile Er.—Killarney.
O. iopterum Steph.—Killarney, rare under bark.
Acrulia inflata Gyll.—Killarney, very rare.
Anthobium ophthalmicum Payk.—Killarney, very common.
Proteinus ovalis Steph.—Killarney.
Megarthus affinis Mill.—Killarney.
Phloeobium clypeatum Müll.—Killarney.
Phloeocharis subtilissima Mann.—Kilrush, Co. Clare; also at Killarney.
 under bark.
Pselaphrus dresdensis Herbst.—Killarney, winter months in wet moss.
Tychus niger Payk.—Limerick; also Killarney.
Bythinus puncticollis Denny.—Killarney, common in moss.
B. validus Aubé.—Killarney, moss under trees.
B. Curtisi Denny.—Killarney, in moss.
B. securiger Reich.—Killarney, garden refuse.
B. Burrelli Denny.—Killarney, in moss.
Bryaxis sanguinea L.—Killarney, in moss on lake sides.
B. haematica Reich.—Kenmare; also at Killarney.
B. juncorum Leach.—Kenmare; also at Killarney.
Bibloporus bicolor Denny.—Killarney, under bark.

- Euplectus aubeanus** Reich.—Killarney.
E. sanguineus Denny.—Killarney, garden refuse.
E. piceus Mots.—Killarney, rare under bark.
E. ambiguus Reich.—Killarney, common in moss in damp places.
Claviger testaceus Preyss.—Crosshaven, Co. Cork, in ants' nests.
Seydmanus scutellaris Müll.—Killarney, in moss.
S. exilis Er.—Killarney, under bark.
Euconnus hirticollis Ill.—Killarney, in moss.
Eumierus tarsatus Müll.—Killarney.
Cephennium thoracicum Müll.—Killarney, in garden refuse.
Agathidium nigripenne Kug.—Killarney, under bark.
A. seminulum L.—Killarney, under bark.
A. laevigatum Er.—Castletown Bere, in moss.
Liodes humeralis Kug.—Killarney, under moss on bark.
Anistoma parvula Sahlb.—Killarney.
Silpha tristis Ill.—Castleconnell, Co. Limerick.
Choleva cisteloides Frohl.—Limerick.
C. agilis Ill.—Killarney.
Hister cadaverinus Hoff.—Killarney.
H. carbonarius Ill.—Killarney.
H. neglectus Germ.—Killarney.
H. bimaculatus L.—Killarney.
Sericoderus lateralis Gyll.—Killarney, garden refuse.
Adalia oblitterata L.—Killarney.
Halyzia xxii-punctata L.—Killarney.
Mycetaea hirta Marsh.—Killarney.
Eपुरaea pusilla Er.—Killarney.
Omosita colon L.—Killarney.
O. discoidea F.—Killarney.
Meligethes lumbaris Sturm.—Killarney.
Cerylon histeroides F.—Killarney, under bark, fairly common ; very large specimens.
C. ferrugineum Steph.—Killarney, common under bark.
Rhizophagus cribratus Gyll.—Killarney, under moss on bark.
R. perforatus Er.—Killarney.
R. dispar Gyll.—Killarney, very common under bark.
R. bipustulatus F.—Killarney, rare under bark.
Silvanus surinamensis L.—Killarney.
Corticaria pubescens Gyll.—Killarney.
C. elongata Humm.—Killarney.
Melanophthalma fuscula Humm.—Killarney.
Antherophagus nigricornis F.—Killarney, rare.
Cryptophagus distinguendus Sturm.—Killarney, under chips in woods.
Atomaria umbrina Er.—Killarney.
A. basalis Er.—Limerick, in flood refuse.
A. berolinensis Kr.—Killarney, in garden refuse.
A. mesomelas Herbst.—Killarney, common in wet moss.
A. ruficornis Marsh.—Kilrush, Co. Clare.

- Attagenus pellio* L.—Limerick ; also Killarney, in old houses.
Aphodius foetens F.—Killarney, common.
A. scybalarius F.—Killarney.
A. lapponum Gyll.—Killarney, common on high land.
A. sticticus Panz.—Killarney.
Geotrupes typhoeus L.—Killarney, common.
Melolontha hippocastani F.—This northern species seems to be of commoner occurrence in the Killarney district than *M. vulgaris*,
Cryptohypnus dermestoides Herbst.—Killarney.
C. quadriguttatus Lap.—Killarney.
Melanotus rufipes Herbst.—Killarney.
Athous niger L.—Killarney.
Sericosomus brunneus L.—Killarney, rare.
Helodes marginata F.—Killarney.
Hydrocyphon deflexicollis Müll.—Common on plants growing on the banks of mountain streams near Killarney.
Podabrus alpinus Payk.—Killarney.
Thanasimus formicarius L.—Killarney, locally common.
Niptus hololeucus Fald.—Limerick, Cork, and Killarney.
N. crenatus F.—Limerick.
Probius castaneus F.—Killarney.
[*Rhizopertha pusilla* F. (Introduced).—Corn store, Limerick.]
Cis festivus Panz.—Killarney, under bark.
Aromia moschata L.—This fine Longicorn is locally common in the Killarney district.
Callidium violaceum L.—Killarney, rare.
Leptidila brevipennis Muls.—Killarney.
Rhagium inquisitor F.—Killarney.
Grammoptera tabacicolor De G.—Killarney, very common on flowers.
G. ruficornis var. *pallipes* Steph.—Rather rare, found with the type, Killarney.
Leiopus nebulosus L.—Killarney, a few specimens.
Pogonochaerus dentatus Fourc.—Killarney, on furze.
Bruchus villosus F.—Killarney, common on broom.
Donacia crassipes F.—Killarney, common on Nymphaea.
D. versicolore Brahm.—Killarney, common on Potamogeton.
D. limbata Panz.—Cork.
D. vulgaris Zsch.—Killarney, a few specimens.
Lema septentrionis Weise.—Killarney.
Lamprosoma concolor Sturm.—Killarney.
Chrysomela hyperici Forst.—Killarney.
Gastroidea polygona L.—Killarney, very common.
Galerucella nymphaeae L.—Killarney.
G. calmariensis L.—Killarney, common on Alders.
Adimonia tanacetii L.—Killarney, rare.
Longitarsus atricollis L.—Kenmare and Limerick.
L. femoralis Marsh.—Kilrush, Co. Clare.
L. gracilis Kuts.—Kilrush, Co. Clare.

- Longitarsus pellucidus** Foudr.—Killarney, common.
Phyllotreta exclamationis Thurb.—Killarney.
Aphthona lutescens Gyll.—Killarney.
Phaleria cadaverina F.—Youghal, Co. Cork.
Tenebrio molitor L.—Limerick.
Clinocera undulata Kr.—Sparingly under bark in the Killarney district.
 This insect is very hard to capture as it is very agile in its movements.
Nascerdes melanura Schmidt.—Cork.
Anaspis rufilabrus Gyll.—Common on Umbellifera, Killarney.
Rhynchites minutus Herbst.—Killarney.
Deporaus betulae L.—Killarney.
Apion miniatum Germ.—Killarney.
A. nigrিতarse Kirby.—Kenmare.
A. radiolus Kirby.—Youghal, Co. Cork.
Caenopsis Waltoni Schön.—County Kerry, very common.
Phyllobius urticae De G.—Killarney.
Hypera alternans Steph.—Killarney.
Liosoma oblongulum Boh.—Kenmare.
Orchestes quercus L.—Killarney.
O. alni L.—Killarney.
O. salicis L.—Killarney.
Gymnetron beccabungae L., var. **veronicae** Germ.—Killarney.
Orobitis cyaneus L.—Killarney.
Cryptorrhynchus lapathi L.—Killarney.
Acalles turbatus Boh.—Killarney.
Ceuthorrhynchus quadridens Panz.—Killarney.
Ceuthorrhynchidius floralis Payk.—Killarney.
Rhinoncus gramineus Herbst.—Killarney.
R. castor F.—Killarney.
Phytobius comari Herbst.—Killarney.
P. quadrituberculatus F.—Killarney.
Balaninus pyrrhoceras Marsh.—Youghal, Co. Cork.
Calandra oryzae L.—Youghal, Co. Cork.
Hylastes ater Payk.—Killarney.
H. opacus Er.—Killarney.
H. palliatus Gyll.—Killarney.
Phloeophthorus rhododactylus Marsh.—Killarney.
Pityophthorus pubescens Marsh.—Killarney.
Trypodendron domesticum L.—Blarney, Co. Cork ; also Killarney.

Erin Hotel, Killarney.

ON IRISH ELK AND OTHER ANIMAL REMAINS
FOUND AT HOWTH AND BALLYBETAGH,
CO. DUBLIN.

BY HENRY STOKES, M.D.

MY first attempt to search for the remains of Irish Elk (*Cervus giganteus*) was prompted by the accidental discovery of the head and antlers of that creature in the Bog of the Loughs at Howth in 1906. Anxious to know whether further remains could be unearthed, some friends and myself commenced operations shortly afterwards which resulted in our finding in this locality an almost perfect skeleton of an Irish Elk, and also three vertebrae which have since been identified as belonging to the same species. Encouraged by this satisfactory result of our labours, and knowing that the head and skeleton of a female Elk had been taken in this bog about twenty years previously, I engaged a labourer in 1911 to renew the excavations and discovered a second skeleton close by. In the following year operations were conducted on a more extensive scale. Three men were engaged to dig for five weeks continuously, but except a few odd vertebrae, a few shed antlers and a nearly pulverised skull, nothing was found.

The experience thus gained in the explorations of peat deposits however proved of much benefit in subsequent researches which were commenced in 1913 on Ballybetagh Bog, near Kiltarnan, Co. Dublin. Thirty-five years previously, Mr. Moss and later on Mr. Williams had discovered there a large quantity of Irish Elk remains, and it seemed likely therefore that the ground should yield further material. The land on which this bog lies belongs to Mr. Roe, and arrangements were made with his permission for further excavations. After consulting Dr. Scharff, he allowed James Duffy, one of his staff in the Museum, to superintend the work, and the latter conducted the operations with skill and great care. The exceptionally dry summer aided us in our work, which proved not only to

be interesting but most successful. Altogether the remains of twenty-eight Elks, of several Reindeer, and of a few birds and beetles were found in Mr. Roe's bog and in a neighbouring one in the County Wicklow belonging to Mr. Mulligan. The great majority of these remains were, of course, in a very fragmentary condition, but it may be of interest to give the results of all the excavations in a tabulated form as follows :—

HOWTH, BOG OF THE LOUGHS.

Irish Elk.

1886-87. Skull of Female, and skeleton.

1906. Skull of Male, and skeleton of young animal, 2 very large shed antlers, and 3 vertebrae (probably) of a female.

1911. (1) A skeleton of a young animal ; (2) 2 shed antlers of a very young animal ; (3) A pulverised male skull which did not belong to skeleton.

The depth varied from 4 to 8 feet, the strata were arranged as follows from above :—

Peat 1½ feet.

Peat and Marl .. 1-2 feet.

Marl 1-3 feet.

Sand ¼-2 inches.

Large stones and thick marl to unknown depth.

All remains were found on or in the layer of sand. The upper layer of marl contained remains of trees. The bones were wrapped and often lined by an envelope of vegetable matter.

BALLYBETAGH, SOUTH-EAST BOG.

(Worked for seven weeks).

Irish Elk.

1913. 22 skulls (mostly broken).

14 shed antlers (all broken).

1 skeleton (made up of the bones of many Elks).

8 1st cervical vertebrae.

2 2nd „ „

2 4th „ „

2 5th „ „

3 7th „ „

1 1st dorsal „

1 2nd „ „

2 coccygeal „ „

4 scapulae, 1 pelvis, 1 1st phalanx, 1 radius,
1 metacarpal, 1 tibia, 6 hyoids, several costal
cartilages and a large number of ribs.

Also remains of Reindeer, including part of a skull, bird bones, and bones of Red Deer were found.

The depth of the pits varied from 3 feet 6 inches to 11 feet. The strata were usually arranged as described by the late Mr. W. Williams,¹ *i.e.*, from below :—

A. Boulder-clay.

1. Fine tenacious clay.

2. Yellowish grey clay.

3. Brownish clay

4. Greyish clay.

5. Peat.

The remains were all found in layers 1, 2, or 3, the great majority lying on No. 2.

Nearly all the bones were sound but badly broken, with the exception of lower jaws and feet bones. The heads were also much broken but sound. The majority of the heads were found 4-6 feet deep, the majority of the bones 5-7 feet. The bones were scattered and arranged in no order. The proportion of 1st cervical vertebrae and hyoid bones was high and the proportion of large long bones was low. Pits were sunk in the centre of the bog to the depth of 11 feet down to the Boulder-clay (Williams), but little or nothing was found. All the remains, with the

¹ *Geological Magazine*, August, 1881.

exception of 2 shed antlers were of large male animals. The 2 shed antlers belonged to a very young animal.

BALLYBETAGH, NORTH-WEST BOG.

(Worked for three days in 1913.)

Four pits were sunk, the deepest to 14 feet. Fragments of bone, which could not be identified except one which seems to be a rib of Irish Elk, shells and wood were found.

The strata from above were in the following order :—

Peat	..	..	3 feet.
Peat and Marl	..	..	3 feet.
Sandy Marl	to unknown depth.		

In this bog the bones of domestic animals recently buried were also met with.

MULLIGAN'S BOG.

This bog (which is situated about 500 yards east of Ballybetagh S.E. bog) was worked for three weeks in 1913, the following specimens of Irish Elk being obtained :—

- 6 skulls of males.
- 5 shed antlers.
- 2 complete skeletons.
- Many ribs and various odd bones.

The strata consisted of the following deposits from above downward :—

1. Peat.
Peat and clay.
2. Brownish clay (Williams No. 3).
3. Fine tenacious clay (Williams No. 1).

The depths of the deposits varied between 3–6 feet. The skulls were found in the shallow parts, whilst complete skeletons were beside them in two cases. The skulls were not broken but very fragile. The bones were entire, one skeleton being in perfect order. The second was absolutely

soft in fact so much so as to make its removal impossible. The remains, except for one small shed antler, belonged to large male animals.

In digging these bogs, one is struck by the fact that in all the localities examined the formation is different. Apart from the peat which covers all, we found that at Howth, the bones lay on sand while no layers of yellowish-grey clay or brown clay existed. At Ballybetagh S.E. bog, all the deposits were present. At Ballybetagh N.W. bog (where we found no definite remains of Elk, but Mr. Williams in his paper implies that remains have been found, and local information tends to confirm this) to a depth of 14 feet we found only sandy clay with shells. At Mulligan's bog there was no greyish clay lying over the bones, but the peat and brownish clay (Williams 3) were directly superimposed.

The fact that at Howth three skeletons and three skulls have been found is a striking contrast to Ballybetagh, where twenty-two heads and one skeleton were discovered, the latter being made up from several animals. Again in the Mulligan bog, six skulls and two perfect skeletons were found, each skeleton lying in a small area with the bones often still articulated. At Howth the bones were not broken though rather soft; at Ballybetagh the bones were all broken though sound; at Mulligan's some bones were perfect and sound, while others were perfect but quite soft.

A curious fact that we found at Ballybetagh was that whenever the points of the antlers would have stuck up into the overlying greyish clay, they were broken off and were usually to be found on the tenacious layer beneath. In the three bogs in which Irish Elk was met with we also discovered the remains of other animals at the same depth and sometimes actually in contact with the Elk remains. In all places the remains were more plentiful in the shallower parts.

I am convinced that the skeletons in Ballybetagh Bog S.E. have been removed away, and are not in the bog as in every case we sank down to the Boulder-clay (Williams). I mention this because some previous diggers had not sunk

all their pits so far, as is proved by the fact that we found a very good pelvis underneath a previous digging, and also a workman (Ned Kavanagh) told me that this was so. In one place many of the points of the antlers and some of the bones showed curious markings caused probably by rubbing against stones, but generally there were no signs of friction on the specimens.

In conclusion, I may mention that caution must be taken in sinking pits near old diggings, as the walls are apt suddenly to fall in. Water seems to lie in an old pit indefinitely and often leaks through cracks and hinders or prevents further work.

Dublin.

REVIEW.

MARINE ZOOLOGY.

Animal Life by the Sea-shore. By G. A. BOULENGER, LL.D., D.Sc., F.R.S., and C. L. BOULENGER, M.A., D.Sc. Pp. xii. + 84, with 91 illustrations. London: Offices of "Country Life." Price 5s. net.

In their modest preface to this admirable little book the distinguished authors tell us that "they have only tried to provide those untrained in Zoology with a means of identifying the principal of the innumerable forms of animal life" to be observed on the beach or between tide-marks. Yet the naturalist will find in these pages many interesting notes on structure and life-history of members of the shore fauna. Except for the Protozoa and a few other very minute animals all great groups of animal kingdom are included in the survey. There are but few "objects of the sea-shore" whose nature could not be at least approximately determined from the descriptions and illustrations. Necessarily some omissions will be noticed by the student of special groups; Flustra is the sole representative of the Polyzoa; among the insects it is surprising to find two species of *Aepus* mentioned, while nothing is said of the interesting bug *Aepophilus*, nor of the midge *Clunio*, one of the most completely marine of all insects. The Pycnogonida, several species of which may be found in rock-pools are not mentioned at all. There are classificatory statements which may be open to criticism, such as the inclusion of the Chitons among the Gastropoda and one absolute mistake is the designation of the marine Geophilid centipedes as "millipedes." All lovers of the shore and its inhabitants will feel indebted to the authors, whose descriptions are supplemented by many excellent illustrations, some being photographs well reproduced and others line-drawings.

G. H. C.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include two Rabbits from Mr. R. F. Millard, a Brambling from Mr. W. J. Williams, four Peafowl from Miss M. Rafter, and a pair of Sable Antelope horns from Mr. E. P. Roe. A Rhesus Monkey has been born in one of the open-air cages. The young female Gorilla continues in excellent health, and is growing taller and stouter. She plays actively with her companion Chimpanzee, whom she challenges to more or less friendly combats by drumming on her chest.

BELFAST NATURALISTS' FIELD CLUB.

JUNE 14, 1913.—EXCURSION TO THE LAGAN CANAL.—Under the guidance of R. H. WHITEHOUSE and J. MAXWELL, a party of thirty travelled along the canal from Hillsborough to Lisburn and collected numerous examples of freshwater animals which were subsequently demonstrated and classified in the biological laboratory of the Queen's University, Belfast.

JULY 26.—EXCURSION TO GARRON POINT.—A small party, guided by R. WELCH and Dr. A. R. DWERRYHOUSE went by rail to Parkmore and thence drove to Garron Point, where the woods and cliffs were explored and the geological structure of the country studied.

NOVEMBER 18.—The President (REV. CANON LETT), delivered an address entitled "A chat about Linnaeus." He dealt with the life and work of the great Swedish naturalist, and especially with his influence on the progress of natural science. Rev. C. H. Waddell and William Gray spoke on the paper, which was preceded by an exhibition of natural history and archaeological specimens.

DECEMBER 16.—The Vice-President (R. LL. PRAEGER), in the chair. G. LIVENS read a paper on "Plants in relation to their surroundings," which dealt particularly with the alternation of generations as found in the main groups of the vegetable kingdom.

FEBRUARY 17, 1914.—Professor AUGUSTINE HENRY, M.A., F.L.S., M.R.I.A. (Royal College of Science for Ireland), read a paper on "The History of Irish Woods and Trees," before a large and representative audience. The chair was occupied by the President (Rev. Canon LETT). Professor HENRY, in the course of his lecture, said the history of the woods of modern Ireland began after the Ice Age, and during this period all the vegetation and mould were destroyed, a barren, sterile soil being everywhere left. He explained the occurrence of the submarine forests, found all round the coast, and of the great forests in the peat, which were formed in the Neolithic period, at the time when the climate was drier than now.

There were pine trees, however, in the great Leinster forest, in 1010 A.D., which were carried to Kincora on the Shannon to make masts for the ships of King Brian. Firs grew, according to a note on an old map, on the mountains of Down in 1570. The association of the pine with the Capercaillie in Ireland was striking, as this beautiful bird gradually became extinct with the increasing rarity of the pine woods. Ireland always had plains on which trees never grew, like the Curragh of Kildare, Lecale in Down, and the great plain of Roscommon. During the Bronze Age man began to clear the forests for the cultivation of cereals and flax, and the agricultural area increased in succeeding centuries. Half the island was probably covered with forest at the time of the Norman Conquest. The woods were remorselessly cut in the seventeenth century, as timber was the main source of profit to the adventurer, who exported oak staves abroad, and established ironworks all over the country, and who consumed for charcoal all the smaller trees. Remnants of the old woods still existed in many parts, and are characterised by a peculiar flora and fauna, which is non-existent in plantations on wooded ground. Professor Henry gave a list of these plants, and alluded to the lingering of two species of *Pyrola* in a few spots as indications of former pine woods. These little plants were dying out, and would become extinct like the Capercaillie. One slug and six kinds of snail were localised in old woods. Professor Henry gave many instances of remarkable woods in Ireland, as the oak and holly woods of Castlewellan, out of which £500 of holly timber was sold in one year. A remarkable oak wood at Glasslough, in Monaghan, in 1801, was reported to be the finest in Europe at that day, being worth £1,000 an acre. Crab trees of great age were common a century ago along the shores of Lough Neagh, and the largest oak that was ever known in Ireland was felled at Portmore about 1750. The most celebrated tree in Ireland is, however, fortunately still alive. This is the famous Yew in the grounds of Crom Castle, in the townland of Crom, in Fermanagh. This tree is remarkable for its enormous spread of foliage, over 200 people being able to sit down to a banquet under its shade. The lecturer had discovered an early reference to this tree in O'Clery's "Contention of the Bards," 1620, where the Yew of Crom is said to have been discovered on the day when Conn of the Hundred Fights was born. This tree has probably an antiquity of over 1,500 years, and may have been associated with the worship of the pagan idol Crom Cruach. A discussion ensued, in which J. M. DICKSON, Rev. J. SHIELS, S. A. BENNETT, A. McI. CLELAND, and R. WELCH took part.

MARCH 17.—The President (REV. CANON LETT), in the chair. N. H. FOSTER read a paper on "How to recognize our common Woodlice," in which the specific characters of the British species were pointed out with the aid of lantern slides. R. WELCH followed with a paper entitled "The History of the Rosapenna Sand-dunes," in which the origin and character of these blown sands and of their fauna and flora were discussed. The papers were discussed by A. McI. Cleland, Miss E. Andrews, and W. J. C. Tomlinson.

DUBLIN MICROSCOPICAL CLUB.

MARCH 11.—The Club met at Leinster House, J. H. WOODWORTH (President), in the chair.

Prof. G. H. CARPENTER showed specimens of Springtails collected in December, 1911, at Granite Harbour, South Victoria Land, 77° S. lat., by Messrs. Griffith, Taylor and F. Debenham of the second Scott Antarctic Expedition. The insects were found on the surface of small pools, under stones clustered on a film of ice. All appear to belong to *Gomphiocephalus Hodgsoni*, Carpenter, the species found in moss at the same locality by the first Scott Expedition in 1906. The specimens now collected are, however, in much better condition than those brought home previously and it is hoped that a fairly complete account of this most southerly known insect may be published shortly.

W. F. GUNN showed the fruiting bodies of a fungus observed in the decomposed tissues of a potato which had been kept in a glass cell for several months. It had been kindly identified for the exhibitor by Dr. Pethybridge, who stated that the red bodies in the decomposed potato are the perithecia of a fungus known as *Hypomyces solani* which according to Reinke and Berthold, has as its coindial stage *Fusarium solani*, Sacc. If the perithecia are gently squeezed under a cover glass, the two-celled diamond shaped ascospores are forced through the terminal pore on the neck of the perithecium. At an earlier stage the perithecia contain asci, each with eight ascospores, but the asci liberate these spores whilst they are still within the perithecium. Hence to see them one must break open a young perithecium.

In confirmation of the views of Renike and Berthold quoted above, it may be mentioned that the potato before being put into the glass box was badly attacked by the dry rot caused by *Fusarium solani*, but a little water was placed in the glass and a wet rot supervened through the agency of bacteria and other organisms.

APRIL 8.—The Club met at Leinster House, J. H. WOODWORTH (President), in the chair.

N. COLGAN exhibited a species of Nemertine worm in course of development from a mass of ova found attached to a stone at low-water near Bullock, Co. Dublin, on the 14th March. The bright yellow ova were contained in flask-shaped capsules, from one to seven in a capsule, and the whole mass, made up of about 100 capsules, was enveloped in an oblong general envelope of clear and very tenacious gelatinous mucus. Several of the ova were found to have fully hatched out after twenty days, the young worms creeping actively and showing two eyes. The young worm, the eggs, and the capsules agreed perfectly with the figures in Plate xxiii. of Mackintosh's "British Annelids," Part I., illustrating the development of *Lineus gesserensis*, though the period of development which he observed for this species was much longer, extending to some six weeks. At maturity *L. gesserensis* has numerous eyes, but for a long time after hatching out the young worm shows but two.

PROF. G. H. CARPENTER showed larvae of *Pseudococcus aceris*, a "mealy bug," which had been found in numbers on apple shoots in Co. Armagh in May, 1913. The species, not hitherto recorded from Ireland, appears to be rather uncommon in Great Britain where it is found on a variety of plants notably on Furze.

NOTES.

ZOOLOGY.

Lissonota vicina, a Rare Ichneumon Fly.

On April 1st I noticed a small Ichneumon fly crawling up and down the window of my dining room. I duly captured it, and on examining it found that it was *Lissonota vicina*, Holmgr. As this is a very rare species in the British Islands I sent the specimen to Mr. Claude Morley, F.E.S., the well-known authority on these insects, and he has confirmed my determination. This is a small species being only about five millimetres in length, black with part of the abdomen red and the legs red with coxae and trochanters black. It is somewhat like the common *L. bellator*, but has the vertical orbits immaculate which in *L. bellator* are marked with white. It has only been once recorded as British by Mr. Bridgman from Earlham near Norwich, in 1893. It is said to be sparsely distributed in northern and central Europe. Its appearance so early in the year is remarkable, for Mr. Morley states ("British Ichneumons," vol. iii., p. 185) "nearly all our species are found only in the late summer and autumn;" and this I have found to be the case with my own captures which have mostly been made in August and September. This specimen probably flew into my dining room as the day was fine and the window where I found it had been open.

W. F. JOHNSON.

Acton Glebe, Poyntzpass.

Coleoptera at Killarney.

In explanation of a discrepancy in my notes under the above heading in the February number of this Journal, where the number of additional records for Ireland is stated as eight and only seven appearing, I may mention that the omitted species is *Ptinus tectus*, Boield., of which I captured a specimen on a window of the New Hotel, Killarney, on July 22nd, but, as Prof. Carpenter informs me, the species has already been recorded by him from Co. Dublin (*Econ. Proc. Royal Dublin Soc.*, vol. i., 1908, p. 587), and by Dr. Nicholson from Co. Meath (*Irish Naturalist*, vol. xxii., 1913, p. 49). This insect, apparently a recent importation from Australia, is becoming rapidly spread over the British Islands.

OLIVER E. JANSON.

Highgate, London, N.

Lapwings and Redshanks at Maidens Light-house, Co. Antrim.

On Wednesday night March 25th, great numbers of Lapwings and Redshanks appeared round the lantern. Most of the Lapwings came in close; several, brushing obliquely against the glass, went off but little injured. But I saw four strike hard and descend stunned to the sea. At 10.40 p.m. I picked up a dead Lapwing at the foot of the tower, and at 4 a.m. procured another, a badly wounded one, on the balcony. The Lapwings were more plentiful than the Redshanks, but the latter more often struck the lantern. Many Redshanks came in contact with the glass, and after fluttering up and down went off strong on the wing; but I saw six strike hard and fall over the balcony down to the sea. I picked one up dead at the foot of the tower at 10.30 p.m. These records of the Redshank appearing in great numbers round and actually striking the lantern will no doubt interest Mr. Barrington, who, writing of this bird's migrations says—"A bird as to whose migrations the evidence of the light-stations is practically nil. It has never been reported as striking, and only two specimens have been received, of which one was shot, and the other killed by a cat." (*Migration of birds at Irish Light-stations, Analysis of Reports, 1881-1897, p. 218*).

C. J. PATTEN.

University, Sheffield.

Missel Thrushes, Fieldfares and Redwings at Maidens Light-house, Co. Antrim.

On Tuesday night, March 31st, Redwings and Fieldfares appeared in large numbers very close round the lantern. Very few actually collided with the glass, and when they did so, generally glanced off obliquely or after striking backed away for a foot or so and then bumped against the glass, repeating this performance several times before leaving altogether. At 12.20 a.m. I picked up a Redwing and at 1 a.m. a Fieldfare. Both these birds struck the glass and fell wounded on the balcony.

About 1.30 a.m., Friday, April 17th, a small number of Missel Thrushes appeared in the rays of the lighthouse lantern, and one struck the glass. The birds frequently uttered their harsh alarm note. This species of thrush did not come under my notice at either Tuskar or Inishtrahull, and, unlike other species of British Thrushes, appears to have been comparatively scarce at lanterns.

C. J. PATTEN.

University, Sheffield.

Carrion Crow at Ireland's Eye.

On the 20th April I was at Ireland's Eye, and saw a bird there which I believe was the black Carrion Crow. It was sitting on a rock near the Stack when I first saw it; it immediately rose and flew round the Stack Rock for a short time. I had a good opportunity of observing it through a pair of very strong Goerz field glasses. Its flight was slow and heavy, like a Raven's, and the primary feathers of the wing seemed to be more separated than in the case of a Rook; the head was like that of Carrion Crows I have seen in Wales, with short feathers at the base of the bill. On being mobbed by Herring-gulls it made off over the island, and as it passed over the ground Green Plover rose in alarm and stooped at it. It finally settled on a rock at the eastern end of the island. I saw no other bird of the crow tribe. It seemed to be quite alone.

GEORGE C. MAY.

April 23, 1914.

A German Appreciation of R. J. Ussher.

In the *Ornithologische Monatsschrift*, Vol. xxxix., No. 1, appears a notice of R. J. Ussher from the pen of Pastor Carl Lindner, from which we translate the following :—"In him Ireland has lost an ornithologist of wide attainments, who devoted himself to the natural history of his own country. With his far-reaching knowledge he combined a delightful kindliness of disposition, and he never hesitated to sacrifice his personal comfort in the pursuit of science. By means of frequent trips of varying length he kept in constant touch with ornithological specialists and with a large body of observers all over the country whom he himself had organized, and by these means he amassed a great body of valuable notes. This material, much of which still remains unpublished, he sifted with scrupulous care. His forte was his highly-trained power of observation, which was reinforced by an indefatigable energy, which shrank from no exertion. Those who had the privilege of making acquaintance with Ireland under the guidance of this kindly veteran, as was the good fortune of myself and my brother, will not soon forget the weeks spent in his delightful society."

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CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the EDITORS, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Contributors are earnestly requested not to write their communications on Postcards.

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LAND AND FRESHWATER MOLLUSCA OF THE
VALLEY OF THE ROE, BENEVENAGH AND
MAGILLIGAN, CO. DERRY.

BY A. W. STELFOX.

ALTHOUGH eighty-eight species of land and freshwater shells have been reported to occur in the County of Londonderry,¹ no locality lists, such as those existing for the adjoining counties of Antrim and Donegal, have been published. Therefore I take this opportunity of recording the species collected during a week's stay in the Roe Valley, at Easter 1913, when in the company of Messrs. R. J. Welch, Nevin H. Foster, S. Wear, and a few other members of the Belfast Naturalists' Field Club. At the same time I include the work done by Messrs. J. N. Milne, R. J. Welch, and myself at Benevenagh and on the Magilligan flat from Downhill to Walworth Wood, on various occasions in years past.

This district is extremely varied in its geological features. On the east it is overshadowed by the north-western escarpment of the great basaltic plateau of Antrim and Derry, of Eocene age, which covers deposits of Chalk and Triassic sandstone. Near Dungiven the Roe cuts in places through sandstone of Carboniferous age, while between the Roe and Lough Foyle on the west, the pre-Cambrian schists form low hills, outliers of the Sperrin Mountains to the south. These schistose rocks are frequently intersected by great belts of crystalline limestone of the same geological age. The greater portion of the ground is covered by Glacial drift, composed mainly of schistose rock-fragments and of Carboniferous and Triassic sandstones ground into a pasty mud, which does not much attract a variety of mollusks. Where, however, the limestone outcrops occur, and especially in the glens of Banagher and in Benady Glen, south of Dungiven, splendid natural ground is to be found, which shelters a luxuriant molluscan fauna. In the localities just mentioned the majority of the species are shade-loving ;

¹Stelfox : A List of the L. and F.W. Mollusks of Ireland. *Proceedings R. I. Acad.*, vol. xxix., Sect. B. No. 3.

but on the sandy area between Downhill and Magilligan Point, the xerophile species are well represented. Several species which occur in the Holocene deposits in these sand-hills have not, up to the present time, been taken in the county in the living state.

In those districts in the north, south or west of Ireland, between which and the great central plain occur barriers—such as mountains, where fresh-water species do not find congenial dwelling-places—one always finds a scarcity of fresh-water shells. This cannot be explained by the absence of suitable habitats and one is forced to the conclusion that (1) after the Glacial Period had passed away, the fresh-water mollusca in Ireland took up their headquarters in the great waterways and marshes of the central plain, and (2) from this centre they are still spreading or attempting to spread north, south, and west. Where they dwelt during the Ice Age, and by what route they subsequently reached the central plain, are matters which cannot even be commented upon in such a small paper as this. The Roe Valley and the marshes about its estuary furnish similar evidence in favour of the above conclusions to those districts of Kerry, Galway, Mayo¹ and Donegal, which are in a like manner isolated from the central plain. Ubiquitous species, such as *Limnaea pereger*, *L. palustris*, *L. truncatula*, *Ancylus fluviatilis*, *Planorbis leucostoma*, *P. crista*, *Valvata piscinalis*, *Aplecta hypnorum* and various species belonging to the genus *Pisidium*, are of course to be met with here; but of 15 species, *Acroloxus lacustris*, *Limnaea stagnalis*, *Amphipeplea glutinosa*, *Planorbis albus*, *P. carinatus*, *P. umbilicatus*, *P. contortus*, *P. fontanus*, *Physa fontinalis*, *Bithynia tentaculata*, *Valvata cristata*, *Anodonta cygnea*, *Sphaerium corneum*, *S. lacustre* and *Pisidium amnicum*, which occur in the basin of the Bann to the east and whose distribution in Ireland is mainly central or their occurrence more common in the central counties, only five—*Planorbis contortus*, *Physa fontinalis*, *Valvata cristata*, *Bithynia tentaculata* and *Sphaerium corneum*—have succeeded in establishing themselves. I would explain

¹See Report on L. and F.W. Mollusca, Clare Island Survey. *Proceedings R. I. Acad.*, vol. xxi., part 23, pp. 44, 43.

this by the fact that between the Bann and the central plain there is no real barrier to the migration of freshwater species, while to reach the present district it would be necessary for species to cross the Sperrin Mountains, or travel circuitously by the Bann or Foyle basin and then spread along the coast, which in the former case would, under present conditions, be impossible ; or be carried by chance means of dispersal from some habitat to the south. While touching on the subject of chance dispersal, I should like to point out that if birds were responsible for the carrying of freshwater shells, the marshes of the Roe Estuary should yield a large list of species, since the shores of Lough Foyle have long been considered among the best districts in Ireland for the observation of migrating species.¹

A close study of the Irish distribution of the five "central" species, which do occur in the present district, will show that they are among the most widely distributed members of the "central" group. In the neighbouring county of Antrim, three of them—*Planorbis contortus*, *Physa fontinalis* and *Bithynia tentaculata*—with *Planorbis albus* and *P. carinatus*, alone represent the "central" species in the basin of the Bush ; and *Physa fontinalis* and *Planorbis contortus* occur on the island of Rathlin in the same county.

LIST OF SPECIES.

- Limax maximus**, Fér.—Near Limavady, Roe Park, Walworth Wood, and very common in the glens about Dungiven. NNN.²
- L. cinereo-niger**, Wolf.—Recorded by Mr. Milne from Walworth Wood and without doubt will be found in the glens of Banagher, near Dungiven. NNN.
- L. flavus**, L.—Under slates in the yard of the hotel at Dungiven ; also in Roe Park (Milne), near the old mill. Probably introduced. ***.

¹I do not wish to deny that birds may carry freshwater shells from one pond to another close by ; but I do not believe that freshwater shells owe their present distribution to transportation by chance means of dispersal.

²The signs following the localities where each species has been found indicate the standing of the species in the district, according to Praeger's formula. See R. Ll. Praeger : Report on Phanerogamia and Pteridophyta, Clare Island Survey. *Proceedings, R. I. Acad.*, vol. xxxi., part 10, p. 38.

- Limax arborum**, Bouch.-Chant.—Dungiven, Walworth Wood, and Roe Park; no doubt generally distributed. NNN.
- Agriolimax agrestis**, L.—Abundant throughout the district. NNN.
- A. laevis**, Müll.—In small glen cut through Triassic sandstone on the western slope of Benbradagh, at 440 feet alt.; also found in the marsh by the river below Dungiven Abbey. NNN.
- Milax gagates**, Drap.—By the old church at Tamlaght—typical form—and in refuse from the town by the river at Limavady—brown form. In the latter station its standing is ***; but at Tamlaght Church it may be NN*.
- M. Sowerbyi**, Fér.—Plentiful near Downhill Ry. Station (Welch, Febr., 1900). Standing doubtful, probably ***.
- Vitrina pellucida**, Müll.—Benevenagh, Magilligan, Glens of Banagher, and Roe Park. No doubt common in winter. NNN.
- Hyalinia cellaria**, Müll.—Not generally distributed and only common in the Glens of Banagher. Also recorded from Benady Glen, Tamlaght Old Church, and the escarpment at Umbra. All specimens may be referred to the usual large Irish form. NNN.
- H. alliaria**, Miller.—Common in Tamlaght Woods and Walworth Wood, also at Benevenagh and in the glens about Dungiven. NNN.
- H. nitidula**, Drap.—Generally distributed. NNN.
- H. pura**, Alder.—Also of general occurrence in the district. NNN.
- H. radiatula**, Alder.—Common in Walworth Wood, frequent about Dungiven; also at Umbra and in the Limavady marshes. NNN.
- H. crystallina**, Müll.—Common almost everywhere. NNN.
- Zonitoides excavatus**, Bean.—Common in Walworth Wood—type and var. *vitrina*; also in Roe Park, Limavady (Milne)—var. *vitrina* only. NNN.
- Euconulus fulvus**, Müll.—Never abundant, but frequent about Dungiven, in Walworth Wood, and at Benevenagh. NNN.
- Arion ater**, L.—Common. NNN.
- A. subfuscus**, Drap.—Common. NNN.
- A. intermedius**, Normand.—Common where found; Benevenagh, Walworth Wood, and about Dungiven. NNN.
- A. hortensis**, Fér.—Very common in some places about Dungiven, but appeared quite absent from neighbouring situations. Thus it was abundant in the Glens of Banagher and yet was not seen in Benady Glen, a few miles to the east. It occurred on Chalk south of Benbradagh, at an altitude of 1,200 feet. Also found at Limavady, Tamlaght, Roe Park, and Umbra. It is always with great satisfaction that I record this species as “undoubtedly native,” since there are so many districts, especially in the west, where it has all the appearance of a recently imported alien. NNN.
- A. circumscriptus**, Johnst.—Of general occurrence in the district. NNN.
- Punctum pygmaeum**, Drap.—In moss in Benady Glen. Common in flood débris inside the “intake” at Limavady Junction (Welch, 1903). NNN.
- Sphyradium edentulum**, Drap.—Tamlaght Woods, Walworth Wood, and about Dungiven, apparently local. NNN.

Pyramidula rotundata, Müll.—Very common. NNN.

Helicella itala, L.—Common on the sandhills of Magilligan. By the railway at Limavady Junction. NNN.

H. intersecta, Poir.—Abundant in places, from Magilligan Point to Downhill. On the boundary wall of Tamlaght Woods (Milne). NNN.

H. barbara, L.—Common on the Magilligan sand-dunes, the western form. The eastern form, var. *bizona*, so abundant at Portstewart, does not occur west of the river Bann so far as I am aware. NNN.

Hygromia fusca, Mont.—In the gullies, between 1,000 and 1,100 feet alt., on the cliffs of Benevenagh. Common in the glens of Banagher, Walworth Wood, Tamlaght, and Umbra (Milne). NNN.

H. hispida, L.—Generally distributed, to 1,000 feet on Benevenagh and 1,200 feet on Benbradagh. NNN.

H. rufescens, Auct.—Two colonies of this species exist in the district at least; but it is evident that it owes its origin in both cases to man. The two stations are (1) on rubbish thrown out of gardens, by the river at Limavady, and (2) by the wall of Sir Harvey Bruce's demesne, above Downhill station. ***.

Acanthinula aculeata, Müll.—Common in Walworth Wood, Roe Park, and in woods between Umbra and Magilligan station. NNN.

A. lamellata, Jeff.—Abundant in Walworth Wood and in the Glens of Banagher. Very common in Tamlaght Woods (Welch, 1904). NNN.

Vallonia pulchella, Müll.—Common on the sand dunes of Magilligan. Near Downhill and abundant in flood débris at Limavady Junction (Welch, 1903). NNN.

V. costata, Müll.—On dry sandhills at Magilligan (Milne, 1892). NNN.

Arianta arbustorum, L.—Very common on limestone by the ford over the Owenrigh, below Carnanbane, in the Glens of Banagher. At Dungiven Abbey and on damp river bank in Benady Glen, two miles above the Abbey, where the river appears to have cut through a Glacial lake-deposit. Hitherto *A. arbustorum* has been found in Derry, only near Coagh. It will, no doubt, be found to inhabit the glens on the Tyrone slope of the Sperrins. While the specimens taken on the limestone near Carnanbane were of a rich brown colour, those from Benady Glen were very pale, some brown, some greenish-yellow, and all very fragile. NNN.

Ielix aspersa, Müll.—Seems absent from the sandhills where one would expect to find it if it were native in the district. It, however, occurs in Roe Park (Milne) and on the railway at Limavady Junction. ***.

H. nemoralis, Müll.—Frequent in the woods, common on the sand-dunes, and occurs on the basaltic cliffs of Benevenagh and Benbradagh to an altitude of at least 1,050 feet. NNN.

H. hortensis, Müll.—Common by the roadside above Downhill, and taken by Mr. Welch in the adjoining glen. All the specimens so far observed have belonged to the vars. *lutea* or *lutescens*. Those referable to the former are of an extremely rich yellow, while the few belonging to the latter form have an almost greenish-white appearance. All are unbanded, and thus resemble the form of this shell which is found

about Strabane and Newtownstewart, twenty-five miles to the south-west, in Co. Tyrone. To the east the nearest known habitat for this shell is thirty-five miles distant, where it occurs in the neighbourhood of Slemish, in Antrim. In the Antrim station the five-banded typical form has alone been found up to the present. It is thus evident that long ages must have elapsed since these various colonies were isolated from each other. NNN.

Cochlicopa lubrica, Müll.—Of general occurrence, but seems unusually rare on Benevenagh, and was not seen by me there until the occasion of my third visit. Abundant on the sand-dunes at Magilligan Point (Milne). NNN.

Pupa anglica, Fér.—Common in places about Dungiven and in Walworth Wood, Tamlaght Woods, and very common below cliffs at Downhill (Welch). NNN.

P. cylindracea, Da Costa.—Common everywhere. NNN.

P. muscorum, L.—Common in flood débris in the "intake" at Limavady Junction (Welch, 1903). Magilligan Point (Welch, 1896), and near Downhill (Milne and Welch, 1900). On the boundary wall of Tamlaght Woods (Milne), and one specimen actually in the woods (Welch), probably brought inland with sand to "manure" the fields. All the specimens are referable to the western form of the species. NNN.

Vertigo substriata, Jeff.—Frequent in moss in Benady Glen, Dungiven. Near Downhill (Welch, 1900). NNN.

V. pygmaea, Drap.—Does not appear common in the district. Walworth Wood (Milne), and in the marsh by the river below Dungiven Abbey. NNN.

[**V. pusilla**, Müll.—**Holocene**. In shell-pockets in the sand-dunes of Magilligan (Welch and Milne).]

[**V. angustior**, Jeff.—**Holocene**. In shell-pockets in the sand-dunes of Magilligan (Welch and Milne).]

Balea perversa, L.—On Benevenagh and on the parapet of bridge on the road from Dungiven to Maghera, near Cashel. Bellarena and Walworth Wood (Milne). NNN.

Clausilia bidentata, Ström.—Generally distributed. NNN.

Succinea putris, L.—By the edge of a drain on the Magilligan flat (Milne). NNN.

S. Pfeifferi, Rossm.—In the marshes by Limavady Junction. NNN.

Carychium minimum, Müll.—Generally distributed and common. Not seen at Benevenagh. NNN.

Phytia myosotis, Drap.—On the sea dyke, near Limavady Junction. Type with the vars. *denticulata* and *ringens*. NNN.

Ancylus fluviatilis, Müll.—Plentiful in the Roe at O'Cahan's Rock, near Limavady (Welch). In a small stream by the station at Magilligan (Milne). NNN.

Limnaea pereger, Müll.—Frequent in the Roe Valley as far up as Benady Glen, and common in the marshes about Limavady Junction. In the Holy Well by the old church of Tamlaght, this shell is abundant, while it occurs also in the lakelet above this spot. NNN.

***Limnaea palustris*, Müll.**—Fine specimens in the marsh by Tamniarin Bridge, which crosses the Roe two miles above Dungiven. In ponds near Magilligan Point (Welch, 1896. Also Milne). NNN.

***L. truncatula*, Müll.**—Frequent, to 600 feet on Keady Mountain. NNN.

***Planorbis crista*, L.**—Formerly common in the pond by the railway at Limavady Junction (Milne); but none were seen by me in this spot in June, 1909, though Mr. Welch took a few here in 1904.

***P. leucostoma*, Millet (= *P. spirorbis*, Auct.)**—In drains by the railway at Limavady Junction; in the marsh below Dungiven Abbey; and in drains on the Magilligan flat. NNN.

Some years ago specimens of this species, *P. leucostoma* Mill., collected by me on Gorteen Point, Dog's Bay, West Galway, were named by the late Dr. Boettger "true *Planorbis spirorbis* of Linné." As, however, I was able to connect these shells with typical *P. leucostoma* by specimens of intermediate form, I came to the conclusion that we had only one species in Ireland, and that, though very variable in form, all our specimens belonged to the *P. spirorbis* of Linné. Since that time I have seen continental examples of the supposed true *P. spirorbis*, which appear to differ specifically from our common Irish shell. Moreover, I have taken a *Planorbis* in the marsh at Ballyphehane, near Cork—Mid Cork—which agree with these continental specimens, and between which and *P. leucostoma* I have been unable to find intermediates. I am now, therefore, inclined to consider that the *P. spirorbis* of British authors must be split into two, viz., *Planorbis spirorbis* of Linné and *Planorbis leucostoma* of Millet. Mr. A. S. Kennard, F.G.S., of London, adopted these two species some time ago, and it is thanks to his help that I have arrived at the above conclusion. Besides those from Cork, I have a single example of the true *P. spirorbis* from the canal near Shalford, in Surrey, which was taken within a few yards of a marsh in which *P. leucostoma* was abundant. Although I believe the two species are distinct, they closely resemble each other, and I have no doubt that many continental records for *P. spirorbis* should really be referred to a large-whorled form of *P. leucostoma*, since I have received from the continent more than one lot of the latter under the name of "*P. spirorbis*, Linné."

***P. contortus*, L.**—Occurs in the lakelet by the path leading up to Benevenagh from Tamlaght Old Church, about 200 feet above sea-level. Also taken on Magilligan Point (Welch, 1896). NNN.

***Physa fontinalis*, L.**—In ponds on the Magilligan flat (Milne, 1893). NNN.

***Aplecta hypnorum*, L.**—In marshes about Limavady Junction and Magilligan, but it appears very local. NNN.

***Paludestrina Jenkinsi*, Smith.**—Abounds in the drains about Limavady Junction, where it was first seen (Welch and Milne) in the year, 1904. In former years it was never seen there by Mr. Milne, though during the "nineties" he collected extensively in the district. NNN.

***P. stagnalis*, Baster.**—Common by the shore of Lough Foyle. NNN.

***Bithynia tentaculata*, L.**—In the ponds on the Magilligan flat (Milne, 1893). NNN.

***Valvata piscinalis*, Müll.**—Occurs in drains near Magilligan station. NNN.

Valvata cristata, Müll.—Very common in shallow drains near the police station at Bellarena (Welch, 1904). NNN.

Acicula lineata, Drap.—Below the cliffs of Benevenagh, at 900 feet alt.; by the waterfall at Lignapaeste, in the Glens of Banagher; in damp moss in Benady Glen, Dungiven; and in the woods near Umbra. NNN.

Sphaerium corneum, L.—In ponds on the Magilligan flat (Milne, 1894). NNN.

Pisidium pulchellum,

Jenyns.

P. casertanum, Poli.

P. obtusale, Pfeiffer.

P. nitidum, Jenyns.

P. personatum, Malm.

} All five species have been identified by Mr. B. B. Woodward among specimens collected by Mr. Milne in Walworth Wood. All are NNN.

Species of *Pisidium* have been taken by me in the following localities, but they have not been identified:—In the lakelet above Tamlaght Old Church, with *Planorbis contortus*; in the marsh below Dungiven Abbey, with *P. leucostoma*; in the marsh at Tamniarin Bridge, near Dungiven, with *Limnaea palustris*; and in a wet field on Keady Mountain, with *Limnaea truncatula*.

ERRONEOUS RECORDS FOR THE DISTRICT.

Ovatella bidentata, Mont.—Owing to a mistake this species has been recorded by me from Derry in the Irish List. This was because I thought that Mr. Milne had taken the species on the shore of Lough Foyle. Mr. Milne, however, tells me that he never saw it in Derry.

Paludestrina ventrosa, Mont.—Supposed specimens of this shell were taken some years ago by Mr. Welch in a brackish marsh near Limerick Junction. They are now regarded by Mr. Welch as abnormal specimens of *P. stagnalis*.

I think that there are but two species absent from the above list that I need comment upon; these are *Zonitoides nitidus* and *Vertigo antivertigo*. It is almost impossible to believe that they do not occur in the marshes of the Roe Estuary, and yet neither Mr. Milne, Mr. Welch nor myself have seen them there. Moreover, their shells were not found by Mr. Welch in the débris which he collected here after the disastrous floods of 1903. We can only imagine, therefore, that for some peculiar reason they are exceptionally rare in this district.

In conclusion, I have to record my thanks to Messrs. J. N. Milne and R. J. Welch for the help which they have given me in the preparation of these notes.

Belfast.

FULMARS, GANNETS, AND OTHER SEA-BIRDS
ON THE SKELLIGS.

BY R. M. BARRINGTON, M.A., F.L.S.

MR. P. J. MCGINLEY, lightkeeper on the Great Skellig, a well-known rocky island, about nine miles west of Valencia, Co. Kerry, writes on March 16th :—"It may interest you to know that the Fulmar is nesting here again this year. When I acquainted the late respected Mr. Ussher of their first visit last season, there was only a small colony of about 11 or 12 pairs. This year the number has increased to upwards of 70 birds. The colony has divided, one section consisting of about 18 birds going to nest at a different point from those of last year—they have chosen the same side of the rock with a northerly aspect ; the new position taken up is inaccessible, being directly under the ' Needle's Eye.'¹

"They first arrived on February 20th, and increased some days afterwards. Guillemots appeared on February 27th, Razorbills and Kittiwakes on March 14th, the Shearwater was first heard on March 8th, but there is no sign of the Puffin yet. Two pairs of Oyster-catchers are going to nest again this year."

In a second letter, dated the 19th of April, Mr. McGinley says :—

"When I left the rock the other day the Fulmar was sitting. All the other birds that frequent the Skelligs are far more numerous this year than they have been for some years past. The Razorbills are in the majority, whereas last season and previous years the Guillemots were most numerous.

"The Oyster-Catcher is becoming plentiful, seven pairs are here now. The "Parrot" (Puffin) was first seen on April 1st, and before April 19th they had taken up their burrows. Several Shearwaters were also in their burrows."

¹ The "Needle's Eye" is a narrow passage on the face of the rock near the summit (710 feet) of the Great Skellig, through which anyone ascending to the top must pass.

THE GANNET.

“This bird,” writes Mr. McGinley, “has now extended its breeding-range to the S.W. side of the Little Skellig, and if they keep on extending as they have been doing for the past few years, the Little Skellig will soon be literally covered with them. As it is, from the N. through E. to S.S.W., the rock is white with Gannets. There remains but a very limited space on the S.W. point that is not actually covered with them, and they have now appeared at this point for the first time. They are becoming more numerous every year.”

The Little Skellig is the oldest breeding-station in Ireland, being known to Smith in 1756. Thompson, in 1850, estimated the number breeding at 500 pairs. In 1880, I estimated there were only 30 to 40 pairs. In 1882, Sir R. P. Galway's estimate was 150 pairs; in 1884 they were increasing; in 1890 Mr. Turle considered there were several thousand pairs. In 1906, when sailing round the Little Skellig, and by counting the birds in a given area, I estimated the total number from 15,000 to 20,000, thus probably exceeding in numbers any other colony on the West Coast of Europe.

THE FULMAR.

In the *Irish Naturalist* for August, 1911 (p. 148), the late Mr. R. J. Ussher first recorded the Fulmar as an Irish breeding bird. In the September number of the *Journal*, he gave details of his most interesting discovery on July 10th of the same year when in company with Herr Lindner, an experienced German ornithologist. They counted eighteen birds sitting on the face of a north Mayo cliff one mile east of Portacloy.

Mr. Ussher then stated that about twenty Fulmars were said to have been seen about an “Ulster Cliff” the previous year, 1910, and remained there during the breeding season. This “Ulster Cliff” is situated on the N.W. side of Horn Head in Co. Donegal. I visited it on June 27th, 1913, and found about 70 pairs of Fulmars nesting. Mr. Ussher told

us that this locality described by Mr. G. V. Stoney of Raphoe (*Irish Nat.*, September, 1912) is the same as that which he, himself, referred to (*Irish Nat.*, September, 1911, pp. 150-151).

Mr. Stoney has kindly written to say that he saw several pairs of Fulmars flying round this cliff in April, 1910, and that in May, 1911, he received two Fulmar's eggs, taken on the Stags of Broadhaven, almost opposite to Portacloy, Co. Mayo. The man who sent them called the bird the "Great Shearwater."

Mr. Stoney was therefore the first ornithologist to detect the Fulmar breeding in Ireland, for he saw them in April, 1910, at Horn Head, and in May, 1910, obtained eggs from north Mayo. He did not publish his discovery nor inform Mr. Ussher, who, independently, when searching for the Golden Eagle in company with Herr Lindner, discovered the Fulmar on the mainland, opposite the Stags of Broadhaven, and published this fact in the *Irish Naturalist*, August, 1911, as above mentioned.

In *British Birds*, July, 1913, I recorded twelve pairs of Fulmars breeding on the Great Skellig, Co. Kerry. In the *Irish Naturalist*, August, 1913, p. 164, Mr. Ussher mentions Tory Island as a second Donegal station, and incidentally refers to the taking of Fulmars' eggs on a precipitous island on the Mayo coast. This refers to the Stags of Broadhaven.

Reviewing the above data, I am of opinion that the Fulmar first settled in Ireland on Horn Head in Co. Donegal, then extended to Co. Mayo, and finally to Kerry, a distance of about 300 miles in three years.

There is not the slightest necessity to protect this species ; its range has been extending southwards on the west coast of Europe for many years. Its wonderful gliding powers, its graceful and buoyant flight, circling round and round with almost motionless wings, render the Fulmar a peculiarly attractive bird.

NOTES ON SOME DIPTERA TAKEN IN THE
SOUTH OF IRELAND.

BY H. W. ANDREWS, F.E.S.

IN view of the paucity of records of Irish Diptera generally, the following lists of species taken in the course of several holiday visits will, I trust, be of sufficient interest to justify their publication. I should mention, however, that as I was working with a view to increasing my own collection rather than compiling a list for publication, I have omitted to note in my later visits several species I had already taken on my earlier ones. I would further mention that a good many of the records are based on single specimens, and that I mainly confined my collecting to the families mentioned in the lists following. Finally, I would thank those kind friends who helped me in the task of identification, especially Mr. Collin, Mr. Grimshaw, Mr. Malloch, and Mr. Wainwright, while Colonel Yerbury, by sending me a copy of his "List" of 1901 put me in possession of much useful information as to localities.

The localities and dates of my visits were as follows :—

Stradbally (Co. Waterford), 3–11th August, 1906 ; 22–30th June, 1907 ; 19–25th July, 1908.

Kenmare (Co. Kerry), 1–5th July, 1907 ; 26th July–1st August, 1908.

Glengariff (Co. Cork), 2–8th August, 1908, and 20–26th May, 1911.

The two latter localities are well-known tourist resorts, and have also been worked for Diptera by Colonel Yerbury¹ in 1901. Stradbally, however, is off the main road, a coastal hamlet between Waterford and Dungarvan about four miles from the latter town. Most of my collecting here I owe to the kindness of Mr. J. G. Beresford, who gave

¹ *Irish Naturalist*, vol. xi., pp. 74–93.

me permission to collect on his private grounds consisting of a well-wooded valley with a small river running through it and coming out on the coast into a sandy cove about a quarter of a mile across ; one of the few breaks in the series of high cliffs that form so grand a feature of the scenery of this part of the coast.

The records of my first two visits emphasise the great difference due to favourable weather or the reverse, and the danger of judging a locality on a single visit. In 1906 the weather was fine and warm during the whole of my stay ; in 1907 there were showers almost every day either in the morning or afternoon, a general lack of sunshine, and a low temperature, and whereas in 1906 I had taken examples of 7 species of the genus *Syrphus*, and in 1901 Col. Yerbury had met with 14 species, in 1907 I did not see a single *specimen* of that genus. The unfavourable weather conditions were also probably responsible for the absence of those Tabanidae which were noted by Col. Yerbury as abundant at Kenmare in 1901 at the same time of the year as my visit in 1907. In this latter year the Umbelliferae heads, usually so favourite a resort for Diptera, were devoid of all but the very commonest species, such as *Empis tessellata* and *Lucilia caesar*, and not unfrequently even these were absent. Speaking generally, the Anthomyidae and Dolichopodidae seemed less susceptible to the weather than the other families to which I paid attention, and I again noticed this fact in regard to the Anthomyidae on my visit to Glengariff in 1911, when I only got three days collecting out of the six of my stay.

In the following lists the nomenclature, excepting in the Tachinidae, is based on Mr. Verrall's "List" of 1901. S.=Stradbally ; K.=Kenmare ; G.=Glengariff. The year only is given, the other dates being already mentioned in my prefatory remarks. The great majority of the insects are in my own collection with the exception of the Tachinidae, which were handed over to Mr. C. J. Wainwright. Those species mentioned in Col. Yerbury's list of 1901 are marked with an asterisk.

STRATIOMYIDAE.

- Oxycera Morrisii *Curt.*—S. '08.
 *Sargus flavipes *Mg.*—S. '06.
 *S. iridatus *Scop.*—S. '06.
 *Chloromyia formosa *Scop.*—
 S. '08.
 Microchrysa cyaneiventris *Ztt.*—
 S. '07.
 *Beris vallata *Forst.*—K. '07.
 B. fuscipes *Mg.*—S. '07.
 Chorisops tibialis *Mg.*—S. '08.
 (a very dark form).

LEPTIDAE.

- *Leptis scolopacea *L.*—S. '07.
 *L. lineola *F.*—K. '07.
 *Atherix marginata *F.*—S. '06 ;
 G. '08.
 *Chrysopilus cristatus *F. (auratus*
 of Verrall's list)—S. '06 and
 '08 ; K. '07.

TABANIDAE.

- *Haematopota pluvialis *L.*—S. '07
 (a pest).
 *H. crassicornis *Whlb.*—S. '06 and
 '07 ; Loo Bridge '07 ; G. '07.
 *Therioplectes montanus *Mg.*—
 Loo Bridge '08 (only two
 specimens seen cp. Col.
 Yerbury's list).
 *Tabanus sudeticus *Zell. var.*
 perplexus *Verr. (female)*—S.
 '06 ; K. and G. '08.
 *Chrysops relictus *Mg.*—S. '06 ;
 K. '08.

ASILIDAE.

- Neoitamus cyanurus *Lw.*—S. '07.

EMPIDAE.

- Hybos femoratus *Mull.*—S. '06 ;
 Comeragh Mts. '07 ; K. '07.
 H. culiciformis *Fab.*—S. '06 and
 '08.
 Cyrtoma nigra *Mg.*—G. '11.
 C. intermedia *Lund.*—Comeragh
 Mts. '07.
 C. pilosa *Lund.*—Comeragh Mts.
 '07.
 Rhamphomyia nigripes *F.*—G. '11.
 R. stigmata *Mcq.*—G. '11.
 Empis tessalata *F.*—S. '06.
 *E. livida *L.*—S. '06.
 E. stercorea *L.*—K. '07.
 E. pennaria *Fln.*—S. '07.
 E. grisea *Fln.*—S. '07.
 Hilara maura *F.*—S. '07 ; G. '11
 (Waterford '11, two or three
 flew into the railway carriage).
 H. pubipes *Lw.*—S. '07.
 H. chorica *Fln.*—K. '07 and '08.
 *Ocydromia glabricula *Fln.*—S.
 '07.
 Clinocera fontinalis *Hal.*—G. '11.
 C. nigra *Mg.*—S. '07.
 Tachypeza nubila *Mg.*—G. '11.

DOLICHOPODIDAE.

- *Psilopus platypterus *F.*—S. '07 ;
 K. '07 and '08.
 Hygroceulethus diadema *Hal.*—
 K. '07.

- **Dolichopus atratus* Mg.—Comeragh Mts. '07; K. '07.
D. melanopus Mg.—K. '07.
D. picipes Mg.—S. '08.
D. lepidus Staeg.—S. '06.
 **D. atripes* Mg.—S. '06; K. '08; G. '08.
D. vitripennis Mg.—K. '07.
 **D. discifer* Stan.—S. '07; K. '07.
D. Wahlbergi Ztt.—S. '06; K. '07; G. '08.
D. pennatus Mg.—S. '07.
D. popularis W.—S. '06; K. '07; K. '08.
D. signatus Mg.—S. '06; S. '07; K. '07.
 **D. urbanus* Mg.—K. '07 and '08.
D. trivialis Hal.—S. '07.
D. festivus Hal.—S. '07.
D. nitidus Fln.—S. '06; K. '07.
D. nubilus Mg.—K. '07 and '08.
D. simplex Mg.—K. '07.
 **D. aeneus* Deg.—S. '07.
Tachytrechus notatus Stan.—S. '07.
Hercostomus nigripennis Fln.—S. '07.
Hypophyllus obscurellus Fln.—K. '08.
 **Gymnopternus cupreus* Fln.—K. '07; G. '11.
G. metallicus Stann.—K. '07; Comeragh Mts. '07.
Gymnopternus celer Mg.—K. '07.
G. assimilis Staeg.—S. '06.
 **G. aerosus* Fln.—S. '07; K. '07 and '08; G. '08.
Chrysotus neglectus W.—Waterford '07.
C. cilipes Mg.—S. '08; K. '08.
C. gramineus Fln.—S. '07; G. '08.
Diaphorus ocellatus Fln.—K. '07.
 **Argyra diaphana* F.—S. '06 and '07.
 **A. leucocephala* Mg.—S. '06; K. '08; G. '08.
A. argentina Mg.—S. '06 and '08; K. '07.
Leucostola vestita W.—G. '08.
 **Raphium longicorne* Fln.—G. '11.
Machaerium maritimae Hal.—K. '07.
Porphyrops crassipes Mg.—S. '07.
Xiphandrium caliginosum Mg.—S. '08.
X. appendiculatum Ztt.—S. '06 and '07; K. '07.
Syntormon pallipes F.—K. '07 and '08; G. '08.
 **Liancalus virens* Scop.—S. '07 and '08.
Campsicnemus curvipes Fln.—S. '08.
Aphrosylus celtiber Hal.—S. '07 and '08; G. '08.
A. ferox Hal.—S. '08.

LONCHOPTERIDAE.

- **Lonchoptera trilineata* Ztt.—K. '07.

PIPUNCULIDAE.

- **Pipunculus furcatus* Egg.—S. '07.
P. modestus Hal.—K. '08.
 **P. flavipes* Mg.—S. '06 and '07.
 **P. confusus* Verr.—S. '07.
 **P. varipes* Mg.—G. '08.

SYRPHIDAE.

- Pipizella flavitarsis* Mg.—S. '07.
P. virens F.—K. '07.
 **Pipiza noctiluca* L.—S. '06 and '07; K. '08.

- Pipiza lugubris F.*—S. '06, '07.
 **Liogaster splendida Mg.*—S. '06 ; K. '07 and '08.
 **Chrysogaster splendens Mg.*—S. '06 ; K. '08.
 **C. hirtella Lw.*—S. '06 ; K. '07. Comeragh Mts. '07 ; G. '11.
 **C. solstitialis Flm.*—S. '06.
Chilosia antiqua Mg.—S. '07.
 **C. scutellata Flm.*—S. '06.
 **C. illustrata Harr.*—S. '06 ; S. '07 and K. '08 (the red form mentioned by Col. Yerbury in his "List" was not taken by me).
C. impressa Lw.—S. '08.
C. Bergenstammi Beck.—S. '08.
 **Platychirus scutatus Mg.*—Comeragh Mts. '07.
 **P. albimanus F.*—S. '06 ; K. '07 ; G. '11.
 **P. clypeatus Mg.*—K. '07 and '08.
 **P. angustatus Ztt.*—S. '06.
 **Pyrophæna granditarsa Forst.*—S. '06.
 **P. rosarum F.*—S. '06.
 **Melanostoma mellinum L.*—S. '06 ; K. '07 and '08.
 **M. scalare F.*—S. '06.
 **Leucozona lucorum L.*—S. '06 (common) ; S. '07 and '08 (scarce).
 **Ischyrosyrphus glaucius L.*—S. '06 (common) ; S. '08 (scarce).
 **I. laternarius Mull.*—S. '06 and '08.
 **Cataboma pyrastræ L.*—K. '08.
 **Syrphus grossulariæ Mg.*—S. '06.
 **S. ribesii L.*—S. '06.
 **S. vitripennis Mg.*—S. '06.
 **S. balteatus Deg.*—S. '06.
S. cinctus Flm.—S. '06.
 **S. cinctellus Ztt.*—S. '06.
 **S. auricollis Mg.* '06.
 **Sphaerophoria menthæstri L.*—S. '06 ; Comeragh Mts. '07 ; G. '08.
 **Baccha obscuripennis Mg.*—S. '06 and '07.
 **B. elongata F.*—S. '06.
 **Ascia podagrica F.*—S. '06.
A. dispar Mg.—S. '06.
 **Rhingia campestris Mg.*—Common generally.
 **Volucella bombylans L.* and *var. plumata*—S. '08.
 **V. pellucens L.*—S. '06.
 **Eristalis aeneus Scop.*—S. '08.
 **E. tenax L.*—Generally common.
 **E. pertinax Scop.*—S. '06.
 **E. intricarius L.*—S. '06.
 **E. arbustorum*—S. '06.
E. nemorum L.—S. '06.
 **E. horticolor Deg.*—S. '06 and '08 (common).
 **E. cryptarum F.*—G. '11.
 **Myiatria florea L.*—S. '06 ; K. '07.
 **Helophilus pendulus L.*—S. '06 ; G. '11.
 **Criorrhina berberina F.*—S. '07.
C. oxycanthæ Mg.—S. '07.
 **Xylota segnis L.*—S. '06 and '07 ; K. '08.
X. lenta Mg.—S. '07.
 **X. sylvarum L.*—S. '06 and '08.
 **Syritta pipiens L.*—K. '07.
 **Chrysoclamys cuprea Scop.*—S. '07.
 **Sericomyia borealis Flm.*—S. '06 ; G. '08.
 **S. lappona L.*—G. '11.
 **Chrysotoxum arcuatum L.*—G. '08.
 **C. festivum L.*—K. '08.
 **C. bicinctum L.*—S. '06, '07 and '08.

CONOPIDÆ.

- **Conops quadrifasciata Deg.*—S. '06.
Oncomyia atra F.—S. '06.
 **Sicus ferrugineus L.*—S. '06 ; G. '08.

TACHINIDAE.

(Mr. C. J. Wainwright has been kind enough to revise this list of Tachinidae).

- **Echinomyia fera* L.—S. '06. *Bithia spreta* Mg. (Demoticus frontatus Boh.)—S. '06; K. '08.
- **E. grossa* L.—S. '06. *Ocyptera brassicaria* F.—G. '08, (very rare—C. J. W.)
- **Micropalpus vulpinus* Fall.—S. '06. **Thelaira nigripes* Fab. (leucozona Panz.)—S. '06.
- Gymnochaeta viridis* Flin.—G. '11
- **Ernestia radicum* F.—S. '06; G. '08. **Dexiosoma caninum* Fall.—S. '06; G. '08.
- E. consobrina* Mg.—S. '06; G. '08.
- E. connivens* Ztt.¹—S. '06. **Prosenia sybarita* F.—G. '08.
- Panzenia rudis* Fall.—S. '06. *Rhinophora lepida* Mg.—S. '08.
- Exorista glauca* Mg.—S. '06 and '08; G. '08. *Sarcophaga brachiata* Pand.²—S. '06.
- Episcampocera succincta* Mg.—S. '06. **S. carnaria* L.—S. '08; G. '08.
- Phryxe vulgaris* Fall.—S. '06. *S. vicina* Vill³—S. '06.
- Tachina larvarum* L.—S. '06; K. '08. *S. melanura* Mg.—G. '08.
- T. impotens* Rond.—G. '08. *Brachycoma devia* Flin.—S. '06.
- Histochoeta marmorata* F.—G. '08. **Miltogramma punctatum* Mg.—S. '08.
- Voria curvinervis* Ztt.—G. '08. **Metopia campestris* Fall.—S. '06.
- Bucentes geniculata* Deg.—S. '06; K. '08. *Onesia aculeata* Pand.—G. '11.
- Actia pilipennis* Mg.—K. '08. **Gymnosoma rotundatum* L.—G. '08. (Very rare—C. J. W.)
- Degeeria collaris* Fall. var. *ornata* Mg.—G. '08. *Alophora hemiptera* F.—S. '07 and '08.

MUSCIDAE.

- **Stomoxys calcitrans* L.—S. '06. *M. hortorum* Flin.—S. '06; G. '08.
- **Haematobia stimulans* Mg.—S. '06, '07. and '08. **Mesembrina meridiana* L.—S. '06.
- Pollenia vespillo* F.—K. '08. *Pyrellia cadaverina* L.—S. '07.
- **P. rudis* F.—Generally common. *P. cyanicolor* Ztt.—S. '07.
- **Myiospila mediatunda* F.—S. '07; K. '07; G. '08. *Euphoria cornicina* F.—S. '07; K. '07.
- **Graphomyia maculata* Scop.—S. '06 and '07. *Calliphora vomitoria* L.—S. '06.
- Musca corvina* F.—S. '08. *Lucilia ruficeps* Mg.—S. '08.
- Morellia simplex* Lw.—S. '06; K. '08. *L. caesar* L.—S. '07.

¹ Very rare, but possibly only a variety of *consobrina* Mg.—C. J. W.

² A pair taken "in cop" are the only British specimens known at present.—C. J. W.

³ One of our commonest species, usually mixed with *carnaria* L. in collections.—C. J. W.

ANTHOMYIDAE,

- **Polietes lardaria* F. } Generally
 **Hyetodesia incana* W } common.
H. lucorum Fln.—S. '07; K. '08.
H. marmorata Ztt.—S. '07.
H. serva Mg.—S. '07.
H. dispar Fln.—K. '08.
H. Goberti Mik.—K. '07.
H. obscurata Mg.—S. '07; G. '11; K. '08.
H. variabilis—K. '08.
H. umbratica Mg.—S. '07 and '08; Waterford '07; K. '08; G. '08.
H. lugubris Mg.—G. '11.
H. semicinerea W.—G. '08; G. '11.
H. errans Mg.—G. '11.
H. signata Mg.—S. '07; K. '07; S. '08.
H. basalis Ztt.—S. '08; G. '08; K. '08.
H. rufipalpis Mcq.—S. '08.
H. scutellaris Fln.—S. '07; G. '11.
H. pallida F.—S. '07 and '08.
H. vagans Fln.—K. '07 and '08.
Mydea urbana Mg.—Generally common.
M. vespertina Fln.—S. '07.
M. tincta Ztt.—K. '07; G. '08; S. '07.
M. nigricolor Fln.—K. '08; G. '08.
M. impuncta Fln.—S. '06 and '07; Waterford '07; K. '07.
M. pagana F.—S. '06, '07.
Spilogaster nigrinervis Ztt.—K. '08; G. '08.
S. duplicata Mg.—S. '06 and '08.
 **S. notata* Fln.—S. '06.
S. trigonalis Mg.—S. '08; G. '08.
S. communis Dsv.—S. '06 and '07.
S. quadrum F.—S. '06 and '07; K. '08; G. '08.
S. consimilis Fln.—K. '07.
S. demigrans Ztt.—S. '07; K. '07.
Limnophora solitaria Ztt.—G. '08 and '11 (not uncommon on rocks in 1911.)
L. contractifrons Ztt.—S. '08 (common on wet places on cliffs.)
L. septemnotata Ztt.—S. '08.
L. aestuum Vill.—S. '07 (on the sand at sea margin).
Limnophora (two other species unidentified).
Hydrotea ciliata F.—S. '07 and '08; G. '08.
H. cyrtoneurina Ztt.—S. '06.
H. irritans Fln.—S. '06, '07 and '08; K. '07.
 **H. dentipes* F.—S. '06 and '08; K. '07; G. '11.
H. similis Mde.—S. '06, '07 and '08; K. '08.
H. militaris Mg.—S. '07 and '08; G. '08; K. '08.
H. albipuncta Ztt.—Waterford '07.
Ophyra leucostoma W.—S. '06 and '07.
 **Drymia hamata* Fln.—S. '06 and '08; G. '08; K. '08.
Trichopticus pulcher Mds.—S. '07; G. '08.
T. hirsutulus Ztt.—Comeragh Mts. '07.
Hydrophoria conica W.—S. '07 and '08; G. '11.
H. socia Fln.—G. '08.
Hylemyia flavipennis Fln.—S. '06 and '08; G. '08.
H. variata Fln.—K. '07.
H. seticrura Rnd.—S. '06 and '08; K. '08.
H. strigosa F.—S. '06; K. '07; G. '11.
Mycophaga fungorum Deg.—S. '07.
Anthomyia radicum L.—K. '07; S. '08.
A. pluvialis—S. '07.
 **Phorbia floccosa* Mcq.—S. '07 and '08; K. '08.

- Phorbia pudica* Rud.—S. '07.
P. discreta Mg.—K. '08.
P. neglecta Mde.—K. '08.
P. ignota Rnd.—S. '06; K. '07;
 G. '11.
Pegomyia bicolor W.—S. '06 and
 '08; K. '07 and '08; G. '11.
P. transgressa Ztt. (?)—G. '08.
P. flavipes—S. '06 and '08; G.
 '08.
Homalomyia hamata Mcq.—S.
 '07; K. '07.
H. fuscula Fln.—K. '07.
H. similis Stein.—S. '07; G. '11.
**H. canicularis* L.—S. '07, '08.
H. aerea Ztt.—S. '07.
H. coracina Lw.—S. '08.
Azelia Macquarti Staeg.—S. '07.
**Caricea tigrina* F.—Waterford
 '07; S. and K. '08.
Coenosia sexnotata Mg.—Water-
 ford, '07; S. '08.
**Fucellia maritima* Hal.—S. '06,
 '07 and '08; G. '08.
F. fucorum Fln.—S. '06 and '07.

ACALYPTERATA.

(As so few of these were taken, they are not divided up into families.)

- Cordylura pubera* F.—S. '07 and
 '08.
**Scatophaga scybalaria* L.—S. '06.
**S. stercoraria* L.—S. '07.
**Orygma luctuosum* Mg.—S. '07.
Coelopa pilipes Hal. (?)—S. '08.
Phycodroma sciomyzina Hal.—
 '08.
Helomyza montana Lw. (*fuscicornis*
Zett.)—K. '07.
Heteromyza commixta Coll.—G.
 '08 (taken hovering in small
 groups about 8.0 p.m., on
 6th August, 1908).
**Actora aestuum* Mg.—S. '08.
**Dryomyza flaveola* F.—G. '11.
Sciomyza cinerella Fln.—S. '08.
**Tetanocera elata* F.—S. '06;
 K. '07.
**T. laevifrons* Lw.—S. '07.
**T. umbrarum* L.—K. '07.
**Limnia unguicornis* Scop.—K.
 '07 and '08.
Elgiva dorsalis F.—K. '08.
Tetanura pallidiventris Fln.—S.
 '07.
**Loxocera albiseta* Schrk.—S. '06.
Calobata cibaria L.—S. '07.
**Rivellia syngenesiae* F.—K. '07.
**Pteropaectria frondescentiae* L.—
 K. '07; S. '08.
**Peplomyza Wiedemanni* Lw.—S.
 '07.
**Sapromyza longipennis* F.—S.
 '07; K. '07.
**S. fasciata* Fln.—S. '08.
S. pallidiventris Fln.—S. '07.
Phora abdominalis Fln.—S. '07.

Shirley, Welling, Kent.

REVIEWS.

IRISH AND BRITISH BEASTS.

A History of British Mammals. By GERALD E. H. BARRETT-HAMILTON, B.A. (Cantab), M.R.I.A., F.Z.S. London: Gurney and Jackson. Parts V. to XV.

It is only with a sense of deep sadness that a reviewer can address himself to the writing of a brief notice of the more recently published parts (V. to XV., inclusive) of the work that Major Barrett-Hamilton has not been spared to carry further. The characteristic style and manner of the author are so noticeable on every page that he seems to start into life as we follow his careful study of the spoor of the Irish Hare, his valuable notes on that animal's seasonal colour-change, or the concise yet elaborate dissertation in which he treats of the slow approach to accuracy that has been made in distinguishing the many genera, species and sub-species of that generally unpopular family the Muridæ. The beautiful drawings and coloured plates by the hand of Edward Adrian Wilson must excite similar feelings in the minds of many. Of these, however, we may expect to see many more as the progress of the work continues, for it is stated in Major Barrett-Hamilton's fine appreciation of his friend the lost artist which appears as a preface to Part XIV. that only "a few drawings were still wanting to finish the scheme" when Wilson started on his fatal expedition to the Antarctic. It would scarcely be possible to find a more pleasing specimen of his skill as an animal painter than the picture of the South Orkney Grass Mice (or Voles, if we may still make an occasional use of a name which Major Barrett-Hamilton has found it necessary to discard from zoological use) appearing in the same part with the announcement of his death.

The parts that have appeared since a previous review¹ comprise the last sub-division of the Bats (Rhinolophidae), the Insectivora, and that comparatively small section of the Rodents (Duplicidentata) whose only present representatives in the British Islands are the Hares and Rabbits (Leporidae). In the latest parts we just touch the fringe of the Simplicidentata, reaching the genera *Muscardinus*, *Evotomys*, and *Microtus*. Of the animals dealt with only five are species occurring in Ireland. These are the Lesser Horse-shoe Bat, Hedgehog, Pygmy Shrew, Rabbit, and Irish Hare. It is well known that the last-mentioned of these animals had long been a subject of special interest to the author, who was favourably situated for observing its ways, and his account of it could not be surpassed for accuracy and care. Major Barrett-Hamilton has no hesitation about assigning it full specific rank, giving his reason as follows:—

"The Irish Hare is given full specific rank because it is a completely isolated form of considerable antiquity, which owes its survival to preservation from competition in an insulated area; it is absolutely distinguishable at a glance from its nearer relatives, with which it cannot

¹ *Irish Nat.*, vol. xx., pp. 86-7.

naturally intermingle, and never intergrades or overlaps in characters. When transported to localities inhabited by other hares, as the Island of Mull, and Vaynol Park, North Wales, it retains its distinctness. It appears to have directly descended from the late Pleistocene *L. anglicus*; the relationship implies a geologically recent connection between England and Ireland."

It is probable that this reasoning would not be accepted at first sight by zoologists of a lumping tendency, without fuller information as to, for instance, the length of time for which the Irish Hare has been known to "retain its distinctness" when "transported to localities inhabited by other hares" so nearly allied to itself as the Blue Hare of Scotland. On another page, however, we are given the supplemental information that the colony on the Island of Mull, where the Scottish and Irish Hares may still be seen together and keep their specific characters, dates from the introduction of twelve specimens from Wicklow "about 1860," and so has retained its characteristics for a sufficient time to give considerable strength to Major Barrett-Hamilton's argument.

Of that singularly interesting and, until lately, much neglected animal the Lesser or Pygmy Shrew (*Sorex minutus*) the account given is somewhat shorter than might have been desired. Although many interesting particulars are given—some of them on the strength of the author's own personal and careful investigation, and others as the result of the important researches carried on by Messrs. L. E. Adams, G. H. Caton Haigh, A. H. Cocks, and other students of the lesser forms of British mammalian life—still, the statement that "in its habits, so far as our scanty knowledge goes, the Pygmy does not differ widely from the Common Shrew," cannot but strike the reader as somewhat unsatisfactory, in view of the remarkable abundance of the Common Shrew in Great Britain—where Mr. Cocks regards it as "probably by far the most numerous mammal in the British Isles"—and the comparative scarcity of the smaller species, not only in England, where it might be looked on as kept down in numbers by the competition of its larger relative, but also in Ireland, where it has no other Shrews to compete with, and might therefore be expected, if really similar in its ways to *Sorex araneus*, to become as common, or nearly so, as that species is where it prevails. Some unascertained but important difference in habits must, one would think, exist to explain this difference in the numbers of the two animals, and the need for further close attention to the ways of Shrews is evident.

Major Barrett-Hamilton accepts as proven nearly to demonstration the conclusion arrived at by Mr. Lionel Adams¹ that Shrews are "annuals," and that the autumnal mortality of both *S. araneus* and *S. minutus* is due simply to the fact of the entire adult shrew population having reached the term of their natural life. Mr. Adams made out, as was shown in this Journal, a strong case for this remarkable conclusion, and no facts, so far as we are aware, have since come to light that are out of harmony with it; but the possibility that a few of the older Shrews hibernate

¹ *Mem. and Proc. Manchester Lit. and Philosoph. Soc.*, liv., 10, 1-13. See also *Irish Naturalist*, vol. xix., pp. 121-6.

each winter has at any rate not yet been disproved, and would agree with what is known of the Dormouse, in which species the older animals hibernate much more successfully than the young ones. On this point, also, the ground for further investigation is open. Though it has been shown that young Shrews are active during the winter, the conclusion may have been too hastily arrived at that the old ones would be equally active if they were alive.

The Lesser Horse-shoe Bat (*Rhinolophus hipposideros minutus*, as the Britannic form is styled in the work before us) is another animal to which it is clear that Irish naturalists ought to pay more particular attention. Its range in this island is confined to the limestone regions of the West, where F. J. Foot and J. R. Kinahan made some meritorious observations on its history half a century ago, and it has in more recent times been thoroughly well studied in one of its British resorts—the Cefn Cave, Denbighshire—by those indefatigable naturalists, Messrs. Charles Oldham and T. A. Coward.

The Rabbit or Cony—Major Barrett-Hamilton was a stickler for the revival of old English names—is the subject of a long and very interesting chapter in which the author's views on protective and warning colours are shown to be not altogether in harmony with those of Darwin and Wallace. The difference, however, does not seem to be very vital. Wallace probably made a mistake in writing as though he thought the white upturned tail of the retreating rabbit was meant to be *followed* by other members of the colony. But that the "signal-flag" has a value as a warning to run—though each of the warned animals runs its own way—is admitted by the author to be at least possible. And in treating of the Hedgehog Major Barrett-Hamilton practically adopts the theory—originated by Mr. Pocock—that it is endowed with properties (some appealing to the ear and some to the nose) corresponding to the warning colours of more diurnal creatures.

If the remaining parts of this work (which Mr. Hinton has undertaken to complete) attain anything like the high level of excellence of those already published it will indeed be an invaluable addition to the scientific literature already existing which treats of the subject of European Mammals.

C. B. M.

THE BADGER.

The Life and Habits of the Badger. By J. FAIRFAX BLAKEBOROUGH and SIR A. E. PEASE, BART. Illustrated. London: "The Foxhound" Offices.

This volume consists of 112 pages of large type and thick paper, divided into an introduction, seven chapters, and an index. Written by a sportsman, it does not profess to deal with the Badger from a scientific standpoint. It adds little to our knowledge since the smaller and more original book entitled "The Badger" was written in 1898 by Sir A. E. Pease, M.P.

The illustrations are few and have no special merit. One naturally looks at first to ascertain if any additional light has been thrown on the great Badger puzzle, *i.e.*, its period of gestation; and it is very disappointing to find that with an increasing number of sportsmen—naturalists and zoologists all over the world—we appear to have advanced not a single step during the past century. Sir Alfred Pease is still of opinion that the Badger goes with young "about nine weeks." Bell, in his "History of British Quadrupeds," 1874, avoids the subject. Flower and Lyddiker writing in 1891 give the period as eleven and a half months; and Sir Harry Johnston, in 1903, as six months. Probably none of our countrymen have had forty years experience of keeping Badgers like Mr. Alfred H. Cocks. In his chapter on Mammals in the "History of Buckinghamshire," he arrives at the remarkable conclusion that the period "may be anything between, under five or over fifteen months;" but he finds that whatever the period is, in over twenty cases all the young were born between February 10th and March 21st. He thinks the young are born at varying periods of maturity.

One cannot help regretting that owing to Major Barrett-Hamilton's lamented death we are left in ignorance of the opinion he had formed amidst such a conflict of testimony—his great work on British Mammals being unfinished.

Truly Sir Alfred Pease has well said in his earlier book that there is "less known about the Badger than any wild animal left in England at the present time." The life history of the Eel lay hidden for centuries. What embryologist will first give an explanation, sufficient to reconcile the conflicting opinions which have just been quoted?

Attention is drawn to the difficulty of killing a Badger, the toughness of its leathery hide, and the tremendous power of its jaws. It can be readily despatched by a blow on the nose, though its snout is unaffected by any number of wasp stings, for it buries its head with impunity in a large nest of *Vespa vulgaris* or *germanica*, the grubs of which form a favourite part of its diet.

There are chapters on the habits of the Badger and exciting accounts of its capture by men with dogs, tongs, spades, and sacks. The authors are of opinion that mangy badgers are rare, that they are very cleanly animals, and instead of causing injury to foxes by infecting them with mange, contribute to their increase by the formation of suitable earths which the Fox subsequently occupies. Badgers are said to be almost extinct in Scotland, and local in England. In Ireland the reviewer is aware of their increase in some counties, and there is no doubt that they occur in almost every district. Both Mr. Blakeborough and Sir Alfred Pease defend the Badger from most of the accusations brought against it, and plead for its protection, by stating their experience, and that of others, as to its comparative harmlessness. Gamekeepers and their employers should read the volume with interest, and naturalists will be pleased to think that one of our native wild animals has two such capable advocates.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Macaque Monkey from Mr. John Gilmer, a Leopard Cub from Miss Moulton, Rabbits from Mr. Duggan, Mr. Bertie Scott, and Mr. G. Clifton, a pair of Peafowl from Mrs. Leech, and a Grass Parrakeet from Mrs. Tew. Another Macaque Monkey and a Bonnet Monkey have been received on deposit, and two Ring-tailed Lemurs have been born in the Gardens, one of which is surviving and likely to do well.

NOTES.

BOTANY.

A Hepatic new to Ireland—*Eremonotus myriocarpus* (Carr). Lindberg and Kaalaas.

Mr. John Hunter of Ballasalla sent me, a short time ago, a number of hepatics to examine, and amongst them I found the above species, which is new to Ireland. It was discovered by the late Dr. Carrington on Ben Venue, Scotland, and has since been found in several other parts of Scotland by Mr. Macvicar and others, also in Westmoreland and North Wales. Dr. Spruce speaks of this as being one of the happiest discoveries of Dr. Carrington; it is a very curious plant and has been placed in several genera, *Diplophyllum* by Dr. Carrington, *Hygrobella* by Spruce; but has found its true place in a genus proposed by Lindberg and emended by Kaalaas. It grows by streams in crevices of moist rocks in subalpine localities in company with *Hygrobella laxifolia* (Hook.). It is a dioicous species and only the plant has been met with in Mr. Hunter's specimens. Locality:—Rocks, Bulbein Mountain, Innishowen, N. Donegal, (Division 34 I.), August 22nd, 1911, *leg.* J. Hunter.

W. H. PEARSON.

Manchester.

ZOOLOGY.

Pied Flycatcher at Ballycottin.

On the 19th of April, I received from Ballycottin Lighthouse, Co. Cork, an adult male Pied Flycatcher in full breeding plumage. This is the thirteenth specimen I have received from light stations, and the only spring specimen obtained in Ireland, with the exception of the adult female procured by Mr. Warren at Moyview, Co. Sligo, in April, 1875.

The occurrence of this second spring specimen leads one a step forward towards suggesting that it may yet be found breeding in Ireland.

RICHD. M. BARRINGTON.

Fassaroe, Bray.

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CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the EDITORS, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Contributors are earnestly requested not to write their communications on Postcards.

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OUR IRISH WARBLERS.

BY REV. CHARLES W. BENSON, LL.D.

To my mind the family Sylviadae or Warblers are the most interesting of all our songsters, though most of them are with us and vocal for only about three months in the year. The Rev. C. A. Johns in his excellent history of "British Birds in their Haunts," of which I am glad to see, a new edition has lately appeared, speaks of warblers as "small and delicately formed birds, most of which are migratory, frequenting in summer groves and woods and feeding principally on small insects which they collect among herbage on the bark of trees or on the ground."

As their name denotes, the majority are musical. The greater number of these birds arrive in Ireland early in the spring, and sing during April, May, and June, a very few in July. Our resident warblers such as the Redbreast and the Hedge Sparrow may be heard in any month in the year.

The "three feathered Kings of Song," as they have been called, are the Nightingale, the Blackcap, and the Garden Warbler. The first of these has never occurred in Ireland, and the other two are comparatively rare.

Our lamented friend Mr. R. J. Ussher, in his great work, tells us that the BLACKCAP has now a wide range in Ireland, and that there are few counties in which it has not been observed. I have myself only identified it at the Dargle, at Bray, at Killiney Castle, and in the neighbourhood of Templeogue. It breeds, however, in the grounds of Mr. R. M. Barrington at Fassaroe, near Bray, every year. According to Mr. Harting the song is simply "delightful," rich and wild, and charming, but all too short, and in this respect my friend the late A. G. More remarked to me that Blackcaps, for some reason or other, did not seem to sing as well in Ireland as in England, where Gilbert White declared the song to be "full, sweet, deep, loud, and wild." It is said that some Americans came over to England especially to hear this famous songster, and found great difficulty in ascertaining its whereabouts, as so few in the country knew of its existence.

Next to the Blackcap, and to my mind before it, comes the GARDEN WARBLER, of which Mr. More speaks in his "List of Irish Birds" as a rare summer visitor and very local. I went a good many years ago to hear it at Mr. Parker's demesne at Castle Lough on the Tipperary side of Lough Derg, and I heard there several birds of this species, and Mr. Parker assured me that as many as twelve pairs had bred in the vicinity. The only other place where I heard this famous warbler was at Lord De Vesci's demesne at Abbeyleix. At Castle Lough it usually makes its appearance in May and continues in full song until June. Its song then begins to decline, though Mr. Parker has heard it as late as the 20th August. Mr. Robert Gray describes the song as "a wild, yet mellow Blackbird song." The Rev. F. O. Morris says that it is "exquisitely sweet, rich, and flute like." Its notes are more sustained than those of the Blackcap, whose song often consists of only a few phrases. It sings also for three months or more in the year. The "Grasmücke," as it is called in Germany and Switzerland, is a great favourite everywhere there, and frequently a cage bird. I have heard it all day long in Switzerland, and for consecutive weeks, long after other birds had ceased to sing. I hope that search will be made for it by some of our bird lovers, it is worth seeking.

We come now to other, perhaps, less gifted songsters, but much more plentiful in Ireland.

Of these four are plentiful and comparatively well known—

Chiff-Chaff, *Phylloscopus collybita*.

Willow Warbler, *Phylloscopus trochilus*.

Whitethroat, *Sylvia communis*.

Sedge Warbler, *Acrocephalus schoenoboenus*.

And two others are known but to a few :—

Wood Warbler, *Phylloscopus sibilatrix*.

Grasshopper Warbler, *Locustella naevis*.

The CHIFF-CHAFF is usually first or second of the spring migrants to arrive on our shores. My earliest date at Balbriggan is March 12th. His well known cheery notes may be heard up to September, when he prepares to take

his leave. In Normandy the bird is called from its note "compteur d'argent," which is in harmony with the word *collybita* derived from the Greek for a money changer. If we approach the Chiff-Chaff closely the song usually ceases, and instead of it we hear only a low chattering sound, "cheep," "cheep," "cheep." The alarm note, according to Meyer, is represented by the word "hoo-id," a note which can only be distinguished by a practised ear from that of the Willow Warbler. This is the smallest of all our migratory birds, its length being only four inches and a half.

WILLOW WARBLER.—This is a delightful songster, and very widely distributed in Ireland. We hear it everywhere, but in Switzerland I find it very seldom. We do not prize this songster as we ought; its song is certainly unique.

Mr. Burroughs, the American naturalist, says of it:—"The most melodious strain I heard, and the only one that exhibited to the full, the best qualities of the American songsters, proceeded from a bird quite unknown to fame, in the British Islands at least; I refer to the Willow Warbler." And Mr. Hudson says:—"The dying fall in its song is indeed affecting, no other bird is so touching in this respect, dying away as it does in a gentle murmur." This bird ceases to sing towards the end of July, but often resumes its song before its departure in September.

THE WHITETHROAT next claims a word, a bird of the thickets and lanes and green hedges, sallying ever and anon into the air singing all the while, a lively and merry warbler indeed, and with some very sweet notes as it sits still for a few moments to soliloquize. We often are first aware of its presence by a solemn warning "chaw" as we pass down a country lane. "Babillard" they call him in France. "That" said a dealer to me, "is the great Impayrial Polly-Whitethroat."

THE SEDGE WARBLER, often styled the "Irish Nightingale," breeds in every county in Ireland, and is a "mocking bird" of no mean repute. Mr. Ussher quotes Mr. Kinahan as saying that it imitates the Blackbird, Whitethroat, Wagtail, Titlark, &c. Gilbert White calls it "a delicate polyglot," and says that "it sings incessantly

imitating the Skylark, Sparrow, Swallow, &c., in a strange hurrying song." Mr. Atkinson calls it "this everlasting little songster."

THE WOOD WARBLER.—This beautiful bird is comparatively rare in our country. Mr. Ussher observes that it has for the most part occurred in the Co. Wicklow. I have heard it at the Dargle, Powerscourt, and Glendalough; its song once heard is not likely to be forgotten, and it is frequently followed, and sometimes preceded, by a curious "jee, jee, jee," in a shrill tone so different from its song, that I have found it difficult to convince a hearer that it was uttered by the same bird.

THE GRASSHOPPER WARBLER is the last of our rarer warblers which I should like to notice, for the Icterine Warbler, a wonderful songster, has only once certainly occurred in Ireland. The Grasshopper Warbler derives its name from its curious note, for, as Mr. Johns says, "it is but an exaggeration of the Grasshopper's note, and resembles the noise produced by pulling out the line from the winch of a fishing rod."

It is best heard on hot summer evenings, and on such occasions I have heard it in the Phoenix Park, at Balbriggan, and at Portlaw in the Co. Waterford, where, in company with my friend, Rev. W. W. Flemyng, I noted as many as five different songs in one evening. Gilbert White says:—"The country people when you tell them that it is a bird will hardly give you credence."

Before concluding these somewhat discursive remarks I wish to say a word about a warbler, one of the most common on the continent, which yet never seems to have found its way to England or to Ireland. I mean Bonelli's Warbler, *Phylloscopus Bonelli*, so called from the distinguished naturalist, Chevalier Bonelli, from whom also an eagle takes its name. When first I saw this bird I took it for a Wood Warbler, but could not understand the difference in its note. I only learned its name, when in company with the distinguished naturalist, Mr. Warde Fowler, I heard it on the Axenstein near Brunnen on Lake Luzern, and he exclaimed "there is Bonelli."

I have heard it every year since when on my summer holiday, and have often wondered that it has failed to cross our "silver streak of sea," and add another to Britain's delightful company of warblers.

The voices of boys and of birds have always had an inexpressible charm for me. And whenever I have listened in England and elsewhere to the Nightingale, or at home to the Blackbird and Willow Warbler, the words of "rare old Izaak" occur to my mind:—"Lord, what music hast thou provided for the saints in heaven, when thou affordest bad men such music on earth!"

Balbriggan.

THE LESSER HORSE-SHOE BAT.

A NOTE ON THE NUMERICAL RATIO OF THE TWO SEXES.

BY C. B. MOFFAT, B.A., M.R.I.A.

THERE is a singular point in the natural history of the Lesser Horse-shoe Bat on which, as the late Major Barrett-Hamilton in his work on British Mammals shows, Irish and English observers of this local species seem to be in complete agreement, and which yet needs to be looked at with a sceptical eye in view of the surprising consequences to which its acceptance would point. This is the remarkable disproportion that seems to exist in the numbers of the sexes.

Foot and Kinahan, exploring the Clare caves inhabited by these bats in 1861, collected fifty-four specimens, of which fifty were males and four females. Similarly, of twenty specimens examined by Foot in 1859, nineteen were males and only one was a female. In the Cefn Cave, near Denbigh, Messrs. Oldham and Coward collected fourteen, and of these twelve were males and two females. In Devonshire, Mr. E. Hollis, by searching limestone rocks in a number of different localities, obtained six specimens, and of these five were males. All the evidence apparently

points one way. In the four cases quoted we have a total of ninety-four Lesser Horse-shoe Bats collected by different observers in England, Wales, and Ireland, and of these eighty-six were males and only eight females—a proportion of practically eleven to one.

Now there is no British mammal that could worse afford so anomalous a wastage. In the case of prolific creatures like rats and mice, a large predominance of males would be no impediment to the full maintenance of the numbers of the species. All that is necessary to keep up the number is that each female shall rear successfully enough young to include one female descendant. But unless she can do that the species must gradually die out. How long, then, must a female Lesser Horse-shoe Bat live to insure the rearing of one daughter? Major Barrett-Hamilton makes it clear that the animal is an extremely slow breeder. Breeding does not begin till the third year; and as only one young one is produced in a season the average age of a female Lesser Horse-shoe would have to exceed four years even if the young of both sexes came in equal proportions. But it would appear from the evidence as to the extraordinary predominance of males that she must live long enough to bear young in at least twelve different seasons in order to insure the birth of one daughter. Her minimum average age would therefore have to be fourteen; and as allowance must be made for some mortality amongst the young, and also amongst the full grown, it is not unreasonable to say that a natural term of twenty years must be allowed to this little animal's life if her species is not to disappear. Is it possible that there should be such a difference in the ages of two of our smallest mammals—the Pygmy Shrew and the Lesser Horse-shoe Bat—as that one of them should need to live twenty years to fulfil her life-task, while the other expires of old age at the end of one year, or at most fourteen months?

It is to be hoped that the question may be solved by further research in the haunts, both Irish and British, of *Rhinolophus hipposideros*.

REVIEWS.

THE GLACIAL PERIOD.

The Quarternary Ice Age. By W. B. WRIGHT. London: Macmillan and Co., Ltd., 1914. Pp. xxiv. + 464, 155 figures and xxii plates. Price 17s. net.

Since the publication of Professor James Geikie's "Great Ice Age" there has been no general comprehensive account of the state of our knowledge of the glacial phenomena of the Pleistocene period, and so many are the newer observations and so numerous the facts recorded since the appearance of that volume, that Mr. Wright's work will be received with gratitude by those who though interested in glacial geology have been unable to keep pace with recent progress owing to the difficulty of access to much of the literature.

The opening chapter contains a clear and useful summary of our knowledge of existing glaciers and their classification to which so much has been added in recent years by Arctic and Antarctic exploration. On page 6 is a somewhat startling statement: "A glacier terminating on land can for obvious reasons never form an esker." This statement is, it is true, somewhat qualified on a later page, but it seems to the writer that there are eskers in many places where it would be difficult to demonstrate the existence of standing water at the time of their formation.

Attention is called to the fact that a large ice-sheet once established necessarily determines its own meteorological conditions, a point which has been largely neglected in discussing the climatic condition of the Pleistocene. Amongst the many matters of interest mentioned with regard to ice-sheets not the least in importance are their nourishment by snow from an otherwise clear sky, and the fact that the great Ross Barrier is afloat.

Difficulties have often been raised as to the relatively small proportion of scratched stones in the moraines of Alpine glaciers, but these should be finally set at rest by the clear statement of the proportion of striated to non-striated stones in the different types of moraine.

The use of the term "Giants-Kettle," on page 33 to designate the closed depressions in the surface of a drift sheet, and usually known as "Kettle Holes," is unfortunate, as the former term has already been adopted for a different formation.

So much has been written lately of interglacial periods that it is good to have such a concise statement of the facts relating to the supposed three-fold arrangement of the drifts, as is here given. The glaciation of Ireland receives attention and recent work upon it, including much which is due to Mr. Wright's own labours is described for the first time. The question of the older and newer drifts of England is discussed, and the extremely slender nature of the evidence in favour of interglacial periods is brought into prominence. The author contrasts the monotonous sheet of boulder-clay of the Southern Midlands of England with the drumlin-

esker-moraine substance of the newer drift as typified by the Central Plain of Ireland, but so far as we can see offers no explanation of the difference.

In the chapter on the glaciation of Europe attention is again directed to the contrast between the older and newer drifts particularly as regards the fact that the loess and the remains of Palaeolithic man are confined to the surface of the former. There follows an excellent and most readable account of the stages of retreat of the ice, and of the relative levels of the sea at the different stages. The Quarternary Mammals and Man each form the subject of a chapter, and the various theories of the Ice Age receive full and lucid treatment. This portion of the work includes an extremely interesting discussion of the isostatic theory and its adequacy to explain the facts relating to the warped shore-lines of North America, and the raised beaches and submerged forests of Northern Europe. Post-glacial changes of climate also receive attention, and the volume concludes with an attempt to correlate the various sub-divisions of the American Drifts with those of Europe.

As regards the cause of the Ice Age, we are left as much in the dark as ever. It must be admitted that, among the theories that have been brought forward to account for the phenomena of the Ice Age, there is not a single one which meets the facts of the case in such a manner as to inspire confidence.

In conclusion, we congratulate Mr. Wright on having produced a most important contribution to the literature of Pleistocene geology, and one which cannot fail to stimulate interest and activity in that most fascinating field of research.

A. R. D.

GANNETS.

The Gannet—A Bird with a History. By J. H. GURNEY, F.Z.S. London : Witherby and Co., 1913. Pp. lii. + 568. Price 15s.

This bulky and weighty volume of about 620 pages, including index and historical preface, is full of information, and although there are 4½ pages of "Notanda and Corrigenda," it is carefully written. At any rate there is evidence of a desire to be accurate. The book is illustrated with over 120 photographs, some very interesting, and maps. It is divided into 22 chapters, the first two of which deal with the names of the Gannet, and its distribution. There are 8 chapters on its various breeding-places, and the remaining 12 chapters treat of its numbers, nidification, nestlings, habits, food, flight, mortality, age, plumage, osteology and anatomy. To those who enjoy reading a monograph full of extracts, ancient as well as modern, and giving the latest information, the work is bound to remain for years to come an invaluable storehouse for reference. We are told that the nesting-places are all on islands, and that the difference between the colour of the young and of the adult is greater than in almost any other bird.

The author considers that owing to the mortality among the young, not one bird in a hundred dies a natural death, and that "it may well be that this one Gannet reaches an advanced age, one, two, or three hundred years." What becomes of the dead birds generally is a mystery which Mr. Gurney thinks has never received a satisfactory solution (p. 429). He considers that of late years Gannets are increasing (p. 434). That the supply of fish for human food is in no way diminished by Gannets is strenuously and rightly insisted upon. Omitting the Canadian islands, with an estimated Gannet population of 10,000, there are only fourteen breeding-stations, Lundy Island having been abandoned. Mr. Gurney estimates the number of Gannets in the world at 101,000, and regards the Little Skellig, Co. Kerry, as one of the largest nesting-sites, with at least 16,000 birds. Recent information sent to reviewer shows the birds at this locality are even more numerous and still increasing.

The summer distribution of the Gannet is said (p. 39) to correspond with that of the Great Auk in former times, if we omit one small Icelandic breeding-station within the Arctic circle.

The Gannet requires a longer period of incubation, and a longer period elapses before leaving the nest than with most birds; the period of incubation is given as 42 days (6 weeks), and when hatched, the young one is fed for 13 weeks, and then, being very fat, remains in the nest without being fed by its parents for ten days (p. 370) when it takes its first flight, and then is said not to fly again for two or three more weeks, during which time there is no evidence to show that it takes food (p. 372). Apparently there is some contradiction in the author's statements (pp. 369 and 374) since in one place it is said that at twelve or thirteen weeks old, the parents consider the young are quite fat enough, and desist from feeding them, and on page 374, the period from the hatching of the egg to the departure of the nestling is given as ten weeks.

There is a remarkable statement on p. 97 that Gannets probably often remain on the wing in winter from forty to fifty hours at a stretch without alighting, and we are told (p. 382) that it can hardly be doubted that soaring birds sometimes sleep on the wing, the Gannet amongst the number. That they have been got in fishermen's nets at great depths has often been alleged, and depths of from seventy to ninety feet have been recorded. Mr. Gurney has timed the bird, and finds that it usually remains under water from five to ten seconds after the plunge. The height of the plunge is under 140 feet (p. 396).

The fall in the price of Gannet oil is said to be due to the fact that Scotch farmers now dip their sheep in chemicals instead of smearing them with grease.

Peter Swave, a Dane, is quoted (p. 181) as stating in 1535 that the Gannet hatches its egg under its foot in a standing position, and Mr. Booth of Brighton, who kept this species in confinement ("Rough Notes," vol. iii.), observes that the old bird spreads the web of one foot carefully over the egg before sitting down (p. 353). John Ray, the celebrated naturalist (1661) is given (p. 206) as an authority for the statement that young Gannets were considered a choice dish and sold for 1s. 8d. each

plucked, and as to their eggs, the author considers them better eating than Guillemots', which may well be the case. The rent of the Bass Rock in Ray's time was £130 per annum; it is now only £17, the tenant recouping himself not by the sale of birds, but by visitors' fees.

Attention is drawn to the very poor sense of smell and hearing in the Gannet, there being no external nostrils and the ear orifice being less than the one-tenth of an inch, and capable of contraction to the size of a pin's head. Its sight is marvellous, since from a height of from 100 to 140 feet it can plunge into the sea and capture a fish several fathoms beneath the surface.

Chapter xvii. deals with mortality amongst Gannets, and that this is excessive amongst the young is well known, but one of the contributory causes does not seem to be directly mentioned, *i.e.*, the difficulty a young Gannet must experience in learning to plunge successfully from a height of 100 feet. Fortunately when it leaves the nest it weighs more than half as much again as its parent, roughly 8 lbs. to 5 lbs. (p. 494), and being surrounded by a layer of fat can exist for some weeks without food. As to the age of maturity, there is, according to Mr. Gurney, a great diversity of opinion. Howard Saunders says 6; Booth, $4\frac{1}{2}$; M'Gillivray, 2; and Gurney, $2\frac{1}{2}$ to 3 years.

The comparative scarcity of immature Gannets about the breeding stations is well known, but it is nothing at all to what takes place in the case of the Kittiwake, the young of the previous year being never seen except on the rarest occasions anywhere near the cliffs in summer. The late Mr. A. G. More was persuaded that the young Kittiwakes, and probably the young Gannets also went far out to sea during the breeding season, an opinion which is corroborated by the fact that on four occasions, when the reviewer was crossing the Atlantic, numbers of immature or "Magpie" Gannets were seen several hundred miles from shore, and around Rockall *all* the Kittiwakes observed were immature.

There are some interesting footnotes—for example:—Mr. Gurney, junior, ascertained that in 1898 24,229 Fulmar Petrels were taken in the Westmann Islands, a Gannet-breeding station, and although a Gannet takes from May 15th, when the egg is laid, to September 25th, when it first begins to fish (p. 375), a young Albatross is ten months old before it can fly at all (footnote, p. 374).

The difficulty of killing an adult Gannet by choking is not alluded to. This is probably due to the numerous air-cells which surround the Gannet's body and communicate with the lungs.

The last two chapters on the Gannet's osteology and anatomy show the wonderful structure of the skeleton, and the system of air-cells above mentioned, without both of which the tremendous force of the impact with the water would stun the bird when plunging from a height of 100 feet.

If the book has any fault, it is, perhaps, due to occasional repetition—this may have been unavoidable. It should be on the book-shelf of every naturalist who takes an interest in one of the most remarkable birds in our British avifauna.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Rhesus Monkey from Miss Johnston, Badgers from Mrs. Sikes and Mr. R. H. M'Keown, a Palm Squirrel from Mrs. Cairnes, a Rabbit from Mr. B. Pringle, Bramblings from Prof. C. J. Patten and Mr. J. L. Dobbin, and three Peafowl from Miss Roe. Two male Lion cubs have been born, the parents being "Conn" and "Mitze." A Mous-tache Monkey, a Red-eared Monkey, and two White-nosed Monkeys from the Belgian Congo have been acquired by exchange.

DUBLIN NATURALISTS' FIELD CLUB.

MARCH 3.—N. COLGAN (President) in the chair. R. M. BARRINGTON exhibited a number of interesting and rare birds, chiefly from light-stations; after which W. B. WRIGHT gave an address, illustrated by carefully prepared blackboard diagrams, on "The Occurrence of Trees in Peat-Bogs." The lecturer traced the order in which the different kinds of trees had appeared, and correlated the succession with changes of sea-level and of climate, as well as with stages in the pre-historic human record. Prof. Henry, A. C. Forbes, R. M. Barrington, R. Ll. Praeger, and the Chairman took part in the discussion.

MARCH 7.—EXCURSION TO THE ZOOLOGICAL GARDENS.—About thirty members and friends collected inside the gate at 2.30 p.m., under the conductorship of Professors G. H. Carpenter, Dr. B. B. Ferrar, and Professor J. Bayley Butler. Delightful weather prevailed, and the gardens were seen to great advantage. Special demonstrations were given at the enclosure containing the Bisons, at the Monkey House (where the distinctions between the Gorilla, Chimpanzee, and Orang-utan were carefully pointed out), at the Fish Hatchery, and at the Reptile House. By the hospitality of the President, tea was enjoyed in the Members' Room at the Haughton House. After tea a visit was paid to the Aye-aye, whose nocturnal habits forbade any earlier disturbance; the interview with this curious animal was, however, very brief.

APRIL 21.—The concluding meeting of the winter session was held at the Royal Irish Academy House, the President in the chair. R. H. WHITEHOUSE, of the Belfast Naturalists' Field Club, delivered a lecture of great interest, illustrated with lantern slides, on "The Structure and Life-History of a Sea-Squirt." The history of the various discoveries and researches which had thrown light on the character of the Ascidians was told in chronological order, and special attention was drawn to the evidence pointing to a process of degeneration. A discussion followed, in which Professor Carpenter, W. F. Gunn, Miss Stephens, the President, and the Hon. Secretary took part, and the lecturer replied. Mr. Selbie exhibited a supposed larval form of one of the Hermit Crabs (*Glaucothoe*), and Mr. Whitehouse showed an ascidian (*Ciona intestinalis*).

NOTES.

ZOOLOGY.

The Opisthobranchs of Co. Dublin.

We propose to issue about August 15th a special double number of the *Irish Naturalist* (for August and September, 1914) consisting of a full account of this section of the marine molluscan fauna of Co. Dublin, by Nathaniel Colgan, M.R.I.A., who has devoted several years' study to the group from both the systematic and bionomic standpoints.

Early Butterflies at Killarney.

The remarkable spell of perfectly calm hot weather which made its appearance in April was much enjoyed at Killarney where the hottest days were the 20th, 21st and 25th, and the maximum shade temperature of 72°, F. was recorded. Butterflies were numerous all over the district, especially Tortoiseshells and Peacocks, and on the sunny side of Cow Island, Lower Lake, I watched from a boat for some time a pair of freshly-born Brimstones flitting through the leafy glades and frequently returning to sun themselves on the hot rocks near the water's edge. A few of the specimens seen were faded and ragged hybernated individuals, but the majority were in beautifully fresh condition evidently hatched out by the unusual heat.

ALEXANDER WILLIAMS.

Dublin.

BOTANY.

The Southern Element in the Britannic Flora.

A paper of more than usual interest to students of geographical distribution in this country, from the pen of Dr. Otto Stapf appears in the *Festband für A. Engler* recently issued as a supplementary volume of the *Botanische Jahrbücher*. Its title is "The Southern Element in the British Flora." Dr. Stapf has analyzed the flora of the British Isles from the point of view of its distribution in Europe, the natural and proper standpoint, suggesting, as it does, the origin of the elements of our flora, where intra-British analysis, such as that of Watson, only leads us to a dead end. Putting on one side all British species which occur in Northern or Central Europe (in a wide sense), he concentrates attention on the remainder, *i.e.*, plants which are confined to the British Isles, France, Spain, or the Mediterranean. These he divides into a Western (Atlantic) and an Eastern (Mediterranean) type, and he traces the range of these along the south, east, and west coasts of Great Britain and Ireland. We cannot here go into Dr. Stapf's figures; but we may say that as regards the origin of our southern flora in space and in time he believes that it migrated as a whole into the British Isles from the southwest in post-glacial times, and he strongly opposes Clement Reid's theory of recent accidental dispersal of the forms of discontinuous distribution.

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CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the EDITORS, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Contributors are earnestly requested not to write their communications on Postcards.

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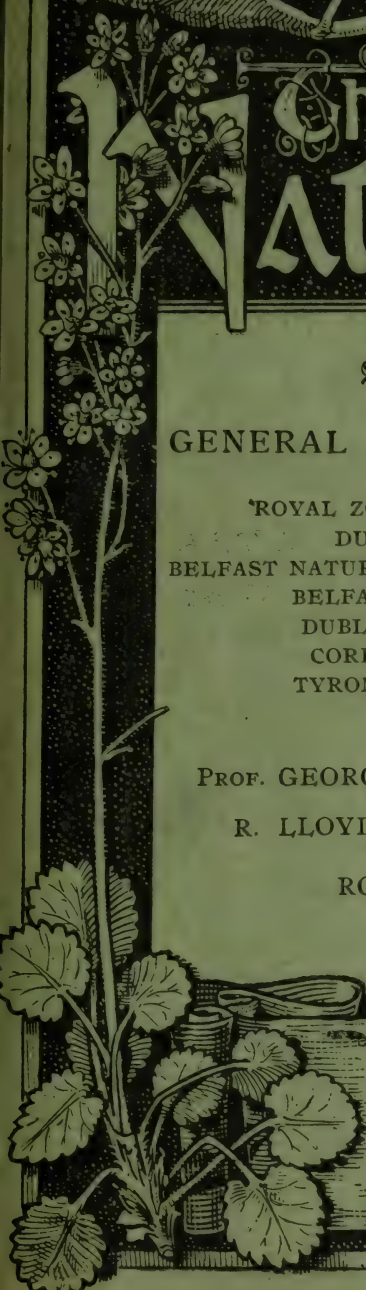
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COUNTY DUBLIN.

BY NATHANIEL COLGAN, M.R.I.A.

The present paper is based chiefly on the results of numerous dredgings and shore gatherings made on the Co. Dublin coasts within the past nine years during which special attention was paid to the Opisthobranch group of marine mollusca. The most important section of this group, the Nudibranchs, had been but little studied on the Dublin coasts when the systematic exploration of their mollusca was taken in hands by the writer towards the close of 1905. At that time only 26 species of Nudibranchs proper, were on record for the county fauna, not a single member of the Ascoglossa, now usually classed with the Nudibranchs, was known to inhabit the area, and the total of Opisthobranch species for Dublin waters stood at 43. To-day the Opisthobranch fauna of the county numbers 69 species, including 45 Nudibranchs proper, and 4 Ascoglossans; and there is reason to believe that further exploration would add several species of this most interesting and beautiful group to the already rich fauna of the Dublin coasts.

The seaward boundary of the marine area dealt with in the following pages has been fixed at the conventional limits of what are known as territorial waters, or roughly at a distance of 3 miles from low water mark of the Dublin shores, and the inshore waters of Lambay, an island lying $2\frac{1}{2}$ miles distant from the nearest point of the mainland, have been included in the county limits. This area is a distinctly shallow water one. In some points, as off Howth Head, off Dalkey Island and off the Nose of Lambay, soundings up to 18 fathoms may be had; in many places and over considerable tracts the soundings range from 10 to 15 fathoms; but nowhere does the depth attain to 20 fathoms, and the greater part of the area gives soundings ranging from 3 to 8 fathoms only. The form of the shores and of the sea bottom is sufficiently varied. At Howth Head, at

Lambay, and at Dalkey the coast is rocky and in parts precipitous; large oozy creeks or inlets are found at Rogers-town, at Baldoyle and at Malahide, and extensive sandy tracts are laid bare at low water at Portmarnock, at Portrane, and on the inner shores of Dublin Bay north and south of the Liffey mouth. The range in latitude of the area is barely 30 miles.

The most interesting of the Dublin dredging grounds, having regard to the rarity of the species yielded and to the narrow limits of the area, is the Malahide River, as the channel is called by which the large Malahide creek or lagoon is alternately filled and emptied at the rise and fall of the tide. This is the *locus classicus* of *Proctonotus mucroniferus*, *Favorinus albus* and *Galvina Farrani* which were first made known to science from specimens taken here in 1844 by Joshua Alder, one of the authors of the famous *Monograph of the British Nudibranchiate Mollusca*, while dredging with Dr. Farran. In addition to these, the following species have been taken in the Malahide River, making up a total of 26 members of the Nudibranch group for this restricted area of a few hundred yards of narrow estuary varying in depth from $1\frac{1}{2}$ to 2 fathoms:—

<i>Elysia viridis.</i>	<i>Dendronotus frondosus.</i>
<i>Limapontia capitata.</i>	<i>Archidoris tuberculata.</i>
<i>Eolis papillosa.</i>	<i>Aegires punctilucens.</i>
<i>Amphorina caerulea.</i>	<i>Polycera Lessonii.</i>
<i>A. aurantiaca.</i>	<i>P. quadrilineata.</i>
<i>Galvina picta.</i>	<i>Acanthodoris pilosa.</i>
<i>Coryphella Landsbergii.</i>	<i>Lamellidoris aspera.</i>
<i>Favorinus Drummondi.</i>	<i>L. bilamellata.</i>
<i>F. coronata.</i>	<i>Adalaria proxima.</i>
<i>Antiopa cristata.</i>	<i>Goniodoris nodosa.</i>
<i>Doto coronata.</i>	<i>G. castanea.</i>
	<i>Ancula cristata.</i>

Of the species recorded for Malahide River, one, *Adalaria proxima*, has here its only Irish station so far as our present knowledge of the Irish Nudibranch fauna extends.

Two other dredging grounds on the Dublin coast, one in the south, Dalkey Sound and its immediate vicinity within a mile radius of the little harbour of Coliemore, the other

in the north, Skerries Bay and its islands, have been well worked and have yielded respectively 28 and 32 Nudibranch species.

So wide is the distribution of marine organisms in general that it would be idle to seek for any well marked local groups within the limits of the Dublin area. Though a few species are apparently absent from one or other of the three localities which have been most fully examined, Skerries in the north, Malahide in the middle, and Dalkey Sound in the south, there can be little doubt that further exploration would show that all of the Opisthobranch species here recorded are distributed throughout the area. So no attempt has been made here to trace out local peculiarities of distribution. But the living organism has been studied so far as opportunity offered; and in the following pages the usual details as to habitat and frequency have been supplemented by the results of personal observation and research on the bionomics, variation, embryology, and anatomy of a large number of species which the writer succeeded in maintaining alive for periods ranging from a few days up to ten weeks.

The nomenclature of Nichols' *List of the Marine Mollusca of Ireland*, so well known to Irish students of the group, has been adopted here, and following the example of the List the specific name used by Jeffreys in his *British Conchology* has been added in italic type where it differs from the List name. Previously unpublished results of the writer's own dredgings and shore gatherings are distinguished by the initials, N.C., and to obviate somewhat the vagueness inseparable from the use of such terms as "rare," "frequent," and "common" as indications of the standing of the various species, details are given of the number of specimens taken and of the number of dredgings in which the non-littoral species occurred. The maximum size attained by each species has been noted in most cases, the measurements being given uniformly in millimètres of 25 to the inch.

In the preparation of this account of the Dublin Opisthobranchs I have received valuable aid from Mr. A. R. Nichols

of our National Museum who has at all times freely placed at my disposal his critical knowledge of our marine mollusca. I am also indebted to Miss A. L. Massy and Mr. G. P. Farran of the Irish Fisheries Office for useful notes and references, and to the Dublin Marine Biological Committee for material taken on its various dredging cruises.

LIST OF THE PRINCIPAL BOOKS AND PAPERS RELATING TO THE OPISTHOBRANCH FAUNA OF COUNTY DUBLIN.

Citations from these works are distinguished in the text of this paper by the contracted titles set out below on the right hand margin.

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Some further Additions to the Marine Mollusca of Co. Dublin. *Ir. Nat.* xvi., p. 160, 1907. Colgan '07A.

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Ir. Nat. xxii., pp. 33-35, 1913, Coigan '13.
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Fisheries, Ireland, Scientific Investigations, 1911 (1912) Massy '12.

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THOMPSON WILLIAM—*continued.*

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WRIGHT, E. P. :

- Notes on the Irish Nudibranchiata. *Nat. Hist. Review*, vi., pp. 86-88, 1859 Wright '59.

Order—OPISTHOBRANCHIATA.

Sub-order—TECTIBRANCHIATA.

Actaeon tornatilis (Linné).

Shells frequent in drift and occasional in dredgings up to 17 f.; seldom taken in a living state within the area. Largest shell, 25 mm. long.

Tornatina obtusa (Montagu).*Utriculus obtusus.*

Shells occasional in dredgings and locally abundant in drift, as on the North Bull where 90 were taken in a single gathering in 1906; living specimens occasional between tide-marks. Largest shell, 4.5 mm. long.

Var. *lajonkaircana* Basterot.—Occasional on the North Bull, 1905-06 : N.C.

T. mammillata (Philippi).*Utriculus mammillatus.*

Rare; shells only. Three shells taken in 13 f. off the Muglins: Colgan, '07A. One shell in drift on N. Bull, 1907, and 12 in 16 f. off Muglins, 1908: N.C. Largest, 2.5 mm. long.

T. truncatula (Bruguère).*Utriculus truncatulus.*

Shells occasional in drift and locally abundant in dredgings, as many as 210 having been taken in a single haul in 16 f. off the Muglins in 1908. Only once taken in a living state, a single specimen in 10 f. off Bullock in 1912 : N.C. Largest, 4 mm. long.

Cylichnina umbilicata (Montagu).*Cylichna umbilicata.*

Rare, Dublin Bay : *Turton*, '16. Twice dredged off Dalkey and Skerries, 4 shells, in 12-13 f., 1906-09 ; one shell in drift, N. Bull, 1907 : N.C. Largest, 4 mm. long.

Volvulella acuminata (Bruguère).*Cylichna acuminata.*

Very rare and not found recently. Portmarnock, very scarce : *Hart*, '92.

Scaphander lignarius (Linné).

Common, living on oozy bottoms all along the coast in from 4 to 14 f. ; often cast up living during easterly gales at N. Bull, S. Bull and Portmarnock, where shells are abundant. Largest, 63.5 mm. long.

Bulinella cylindracea (Pennant).*Cylichna cylindracea.*

Shells not infrequent in dredgings up to 17 f. and in drift at Rush, Portmarnock, N. Bull, and S. Bull, 1905-09 : N.C. Largest, 14.5 mm. long.

Diaphana hyalina (Turton).*Utriculus hyalinus.*

Rare in drift and in dredgings. At Portmarnock (Mr. Warren), *Thompson*, '44. Dalkey Sound (Dublin Museum), *Nichols*, 1900. Two shells in drift, Lambay Harbour, *Colgan*, '07. One shell in 16 f. off Muglins, 1908, and 3 in drift, N. Bull, 1906-08 : N.C. Largest, 3.5 mm. long.

***Bulla hydatis* (Linné).**

Very rare. Balbriggan, very rare: *Turton*, '16. Balbriggan (J. Adair), *Adams*, '78.

***Acera bullata* (Müller).**

Locally abundant. Balbriggan: *Turton*, '16. Swords estuary, in pools at low water near the north-west shore, where I found hundreds alive (J. Adair), *Adams*, '78—a few here near Lissen Hall, 1910: *N.C.* Baldoyle: *Hart*, '92. Malahide Island, opposite the Arches: *Miss A. L. Massy*.

***Philine aperta* (Linné).**

Locally abundant living on oozy bottoms all along the coast; shells abundant in drift after easterly gales, as at N. Bull, S. Bull, and Portmarnock, 1905-13: *N.C.* Largest shell, 21 mm. \times 14.5 mm.

***P. scabra* (Müller).**

Rare in drift and in dredgings. At Portmarnock (Mr. Warren), *Thompson*, '44. Dalkey Sound: *Walpole*, '53. Five shells in drift, North Bull, 1 on S. Bull, and 1 in 10 f. Dalkey Sound, 1906-11: *N.C.* Largest shell, 5.5 mm. long.

***P. punctata* (Clark).**

Rare, both living specimens and shells, in dredgings and between tide-marks. Dublin Bay: *Jeffreys*, '67. Portmarnock: *Adams*, '78. Seven shells taken in four drift gatherings at Lambay, Portrane, Rush and N. Bull, 1906-07; 6 living specimens in from 8-17 f. off Skerries and Dalkey, 1906-13; and one living specimen at low water mark, Bullock, 1912: *N.C.* Largest, 2.5 mm. long.

In captivity this species is an active crawler and much given to floating foot upward on the water surface.

***P. pruinosa* (Clark).**

Rare. One shell, 3 mm. in length, found in drift on the North Bull, 1906 : *Colgan*, '06.

***P. catena* (Montagu).**

Rare, living in dredgings and between tide marks, shells in drift and in dredgings. Dalkey Sound, very rare : *Walpole*, '53. One shell in each of four drift gatherings at Lambay, Portrane, Portmarnock and N. Bull, 1906 ; off Dalkey, 3 shells, 10–16 f., and one living specimen in 17 f., 1906–08 : *N.C.* One living, in a half-tide pool, Shennicks Is. : *Colgan*, '09. One, living, in Dublin Bay : *Massy*, '12. Largest, 3 mm. long.

Runcina coronata* (Quatrefages).R. Hancocki.*

Locally abundant, living between tide-marks and not infrequent in shallow water dredgings. Several specimens on S.W. shore of Lambay Island (H. J. B. Wollaston), *Colgan*, '07. Eight specimens dredged in 2 f. in Malahide River, 1907–08 : 43 specimens taken between tide marks, Bullock and Dalkey Islands, 1907–12 : *N.C.* Largest, 6.5 mm. in motion.

This species was found to be frequent between tide-marks along the Dublin coast for at least 8 months in the year from November to June inclusive. Several individuals taken at Bullock were found to have slender, pear-shaped bodies of whitish colour protruding from the head, the back and the foot. These were probably the egg-sacs of parasitic copepods. Like many of the true Nudibranchs *Runcina* is able to suspend itself from the water surface by a slime thread and to regain the surface by climbing the thread. In May, 1908, one was observed to mount in this way for half an inch in the space of two minutes : *Colgan*, '09A.

***Aplysia punctata* (Cuvier).**

Occasional in dredgings ; sometimes abundant between tide-marks. Dublin (R. Ball), *Thompson*, '40. Dredged 10

times off Dalkey and Howth Head in from 7 to 14 f., 1907-13, a total of 20 mature and 2 juvenile specimens: *N.C.* On the 2nd July, 1908, this species was observed to have made a remarkable invasion of the tidal waters between Shennicks Island and the Skerries mainland. No less than 300 individuals of large size, ranging from 5 to 7 inches while in motion, were counted at low water crawling over the sands or about the base of *Chorda filum* in water a few inches deep. By the 28th of the same month only 50 specimens could be found here, the majority having probably migrated to deeper water. Although no trace of the species could be found here in July, 1910, or August, 1911, it reappeared in abundance in July, 1913, when 141 specimens were seen, as many as 70 within a space of 50 yards.

The juvenile specimens, each 5 mm. long, dredged off Dalkey in August, 1911, were a vivid carmine in colour, the black eyes were very conspicuous, the margins of the median flaps or wings were bordered with black, and sprinkled with opaque white spots, while similar spots appeared at the tips of the tentacles and formed vertical lines along their sides. This juvenile form is no doubt *Aplysia nexa* of Thompson, and *A. rosea* of Rathke. Mature Dublin specimens range in colour from blotched citron through light brown to almost black.

In Ireland the spawning season of this species is sometimes prolonged far into autumn. In 1913 I took a freshly laid spawn coil in 10 f. off Bullock so late as the 5th November, and in 1911 several fresh coils on the shores of Clew Bay on the 23rd September. On the 6th July, 1912, coils were found to be frequent on *Fucus serratus* in half-tide pools at Skerries, a rough computation giving for one large coil a total of 30,000 embryos at an average of 5 per egg, the embryos in this coil ranging from 3 to 7 per egg. The eggs hatched out freely in captivity, producing swarms of reddish brown veligers. The spawn is deposited on various supports, vegetable and animal. At Skerries I have found it on *Zostera* on *Chorda filum*, on *Fucus serratus*, and *F. vesiculosus*; at Dalkey I have dredged it twice in from 10 f. to 12 f. attached to *Hydrallmania falcata* and once wound

round a one inch specimen of the Common Ascidian, *A. mentula*. Though usually a dull pink or red brown I have twice found coils of a clear yellow. The food of the *Aplysia* appears to consist chiefly of the smaller littoral sea weeds. The stomach contents of two large Skerries specimens kindly examined for me by Mr. A. D. Cotton, of Kew Herbarium, were found to be made up for the most part of *Polysiphonia nigrescens* and *Ceramium rubrum*.

The radula of this species well illustrates the changes in form and numerical relations which that organ undergoes in the process of growth. Dissection of three individuals A, B, and C, respectively 12 mm., 38 mm., and 175 mm. in length (while alive and in motion) gave the following results :—

	A.	B.	C.
Length of radula	2.5 mm.	5 mm.	9 mm.
Dental formula	21 × 10 · 1 · 10	26 × 14 · 1 · 14	46 × 17 · 1 · 17

In counting the lateral teeth the 3 or 4 simple plates forming the extreme outer members of the row were in all cases included.

Along with these numerical changes a marked change took place in the form of the median tooth. In the youngest individual (A) the tooth was hollowed out by a deep posterior sinus or bay into which the denticulate central cusp of the tooth projected for its whole length. In the oldest individual (C) the bay had become almost obsolete by an increase of the basal portion of the tooth so that the central cusp altogether lost its prominence. These changes are in general agreement with those described and figured by Mr. Walter Garstang in his "List of the Opisthobranchiate Mollusca found at Plymouth,"¹ where he contends that *A. depilans* is but a luxuriant form of *A. punctata*.

***Pleurobranchus membranaceus* (Montagu).**

Rare. Dublin Bay: *Kinahan*, '61. Portmarnock: *Adams*, '78. One specimen 70 mm. in diameter dredged in 7 f. in Dalkey Sound, May, 1913; three specimens 35–45 mm. in

¹ *Journ. of Marine Biol. Assoc.*, 1890.

diameter dredged off Church Island, Skerries, July, 1913, two in 14 f., the other in 15 f. : N.C.

The Dalkey and Skerries specimens were all similar in colour, the mantle being netted with chestnut brown on a yellowish ground, the brown colour surrounding the numerous large and small tubercles which studded the mantle surface. The wide foot with flexible waved margins projected somewhat beyond the mantle and was pale buff in colour with faint pinkish lines and blotches. At its posterior end was a conspicuous wedge-shaped slightly depressed area, the apex pointing forwards, and in form resembling the reflexed tail of a crab. The tubercles of the mantle were highly extensile. Dome shaped while retracted, they were frequently protruded into fleshy cones up to 5 mm. in length. The mantle epidermis was stiffened by spicules, irregularly stellate and usually 5-rayed. These were large and thickly aggregated round the bases of the tubercles, small and thinly-sown in the interspaces. The radula and tessellated jaws were very similar to those of *P. plumula*, the dental formula of the largest specimen being $57 \times 75.0.75$.

When placed in large jars soon after capture all of the three specimens taken were seen to float foot upward in the water and to progress by gentle undulations of the foot-margins. The largest specimen lived in captivity for two days, and at intervals protruded a long and flexible proboscis extending fully an inch in advance of the tentacles. The animal crawled very slowly, adhering only by the extreme posterior end of the foot, its rate of travel being 1 inch in 2 minutes.

***P. plumula* (Montagu).**

Not infrequent under stones between tide-marks. Dublin Bay : *Kinahan*, '61. Portmarnock (Warren Coll., Dublin Mus.), *Nichols*, 1900. Three specimens at low water, Red Island, Skerries, 1906, and 3 others at Shennicks Island, 1906-08 ; 10 specimens at low water, Sandycove, 1908-14 : N.C. Largest, 61 mm, long while in motion.

A specimen taken at Sandycove in June, 1909, lived with me for 17 days, and on the 5th July deposited an elliptic spawn coil of two turns measuring 45 mm. \times 29 mm. The cream-coloured eggs were irregularly disposed in a double layer in the ribbon which was 9 mm. wide, and attached by its edge like the spawn coil of *Archidoris tuberculata*.

Sub-Order—ASCOGLOSSA.

Hermaea dendritica (Ald. and Hanc.).

Rare. A single living specimen 3 mm. in length taken on coralline at low water, Bullock, April, 1908: *Colgan*, '09. One specimen, 3.5 mm. long, at low water, Dalkey Island, May, 1913: *N.C.*

Elysia viridis (Montagu).

Not infrequent, living, between tide-marks and in shallow water dredgings. Four specimens taken in 2 f., Malahide River, May–November, 1907–08: *Colgan*, '08 and '09. On small seaweeds in half-tide pools at Bullock where 35 specimens were taken in 10 gatherings, 1909–13, from 1 to 7 in a gathering: *N.C.*

The largest of the Dublin specimens, one taken at Malahide in May, 1908, was fully 26 mm. long when in motion; another taken at Bullock, January 23rd, 1909, was 22 mm. This latter specimen lived in captivity for two months and a half, and on the 3rd March laid a flat spawn mass of 3 coils, irregularly circular or rather rounded quadrangular in outline, and measuring 7 mm. \times 6 mm. The ribbon, which was not attached by its edge but laid flat, was about 1 mm. in width and crossed at intervals by translucent bands apparently marking breaches of continuity in the process of spawning. The eggs were bluish-white in colour, small and very numerous, a rough computation giving a total of 10,000 for the whole mass. The radula in this species matures early. It was examined in three Dublin specimens, one 12 mm., the others each 20 mm. long in motion. There was a total of 20 teeth in one of the larger

specimens, and 21 in the other, while the smaller specimen had 20 teeth in its radula with fully 20 discarded worn teeth in the ascus.

In Dublin this species varies much in colour. Bright green specimens are much less frequent than those of dull olive or reddish brown tints. As Pelseneer has shown for the variety or form *aurantiaca*, these colours are derived from the food plant. Emerald green individuals placed by him on red sea-weeds were found to have changed colour from green to the red-brown of *aurantiaca* in the space of 18 days. On the Dublin coast the typical green form was found to feed on the green sea-weed, *Cladophora rupestris*.

***Limapontia capitata* (Müller).**

L. nigra.

Locally abundant in stagnant pools between high-water and half-tide marks, almost invariably on *Cladophora rupestris*; occasional in shallow water dredgings. In half-tide pools at Bullock, where 47 specimens were taken in three gatherings, May-June, 1908; one specimen dredged in 2 f., Malahide River, May, 1908; several specimens at Red Island, Skerries, and 2 on Shennicks Island, July, 1908: *Colgan*, '09. Nine specimens at Dalkey Island, June, 1908; 107 at Bullock in 8 gatherings, 1909-13, from 1 to 52 in a gathering; 9 at Rush in 1910, and 7 at Skerries, July-August, 1910-12: *N.C.* Largest, 5 mm. long in motion.

This species spawns very freely in captivity, the egg-masses being elongate, pear-shaped, slightly curved, and from 2 to 6 mm. in length. They contain numerous (from 50 to 100) small globular eggs with a yellow yolk suspended in clear fluid. A single pairing is sufficient for the fertilization of several egg-masses. A specimen from Bullock isolated on the 19th June, 1912, laid no less than 10 distinct egg-clusters between that date and the 30th of the same month. Although in many cases development proceeded up to the stage of rapid revolution of the embryo within the egg, in no instance did the veliger succeed in breaking free from the shell. Some of the specimens were found to be infested with parasites, apparently copepod crustaceans

the body of the animal being studded over with prominent shortly-stalked knobs which under the microscope showed yellow granules within, the whole resembling copepod egg-sacs. The favourite food of *Limapontia* on the Dublin shores, at all events, is *Cladophora rupestris*. Fresh sprays of this weed placed with living specimens of the animal were observed within a few days to be completely stripped of their green matter, only the translucent frame-work of the leaves remaining.

An examination of the radulae of 12 Dublin specimens showed the total number of teeth to vary from 9 to 11. Meyer and Möbius found the total in their largest Kieler-Bucht specimens 8 mm. long to vary from 16 to 18.

***Actaeonia Cocksii* (Ald. and Hanc.).**

A. corrugata and *Cenia Cocksii* (Ald. and Hanc.).

Locally abundant in rather stagnant half-tide pools, always on *Cladophora* and usually associated with *Limapontia*. Between October, 1907, and May, 1913, 131 specimens were taken in 16 shore gatherings. The following are the details of the various gatherings:—Ten specimens at Bullock, October–November, 1907 (Colgan, '08); 1 at Shennicks Island, and another near Loughshinny (Colgan, '09); 8 in a pool between Dalkey Island and the Lamb, June, 1908 (*Irish Naturalist*, xvii., p. 164); 16 near the Martello Tower, Rush, 1910; 95 in 12 gatherings at Bullock, January, 1909–May, 1913, from 1 to 35 in a gathering. Largest, 6 mm. long while in motion.

The earlier gatherings at Bullock as well as those made at Skerries, Loughshinny and Dalkey Island were recorded as *A. corrugata*, but further study, including observation of the development from the egg almost up to the fully adult stage, has convinced me that *A. corrugata* is but an immature state of *A. Cocksii*. The two species of Alder and Hancock have accordingly been united here. They were described and figured simultaneously and for the first time in the *Annals and Magazine of Natural History* for June, 1848, under different genera as *Actaconia corrugata* and *Cenia Cocksii*. The genus *Cenia* was subsequently (1869, in Jeffreys' *Brit. Conch.*, vol. v.) abandoned by Alder,

and its single species transferred to Actaeonia under the name *A. Cocksii*. As *Actaeonia (Cenia) Cocksii* was described and figured from a mature individual it seems best to adopt for the two species here fused into one the name *A. Cocksii* rather than the contemporaneous *A. corrugata*, founded, as I believe, on an immature specimen.

In some of its earlier stages, while the head appendages are as yet imperfectly developed, Actaeonia is very similar in form and colour to Limapontia. The eggs and egg-clusters in the two genera are, however, strikingly dissimilar. In Actaeonia the clusters are rounded elliptical, while the eggs are some six times as large as those of Limapontia and much less numerous, an average of 13 being given by 23 clusters laid in captivity by Irish specimens. The bright orange yolk is immersed in a milky medium, so that the clusters appear as white spots about 2 mm. in diameter standing out far more conspicuously from the Cladophora twigs to which they are usually attached than do the elongated pellucid clusters of Limapontia.

The specific character relied on by Alder and Hancock as distinguishing *A. corrugata* from *A. Cocksii* is the form of the head appendages. These are described as short, flat, whitish tentacular processes in the first species, and as linear cylindrical tentacles of moderate length in the second. A first examination of many living Dublin Actaeonias showed that they possessed the short, flat tentacular processes distinctive of *A. corrugata*; but on a second examination made from 3 to 6 weeks later these short flat processes were found to have developed into the linear and cylindrical tentacles of *A. Cocksii*. One egg-cluster of 12 eggs taken at Bullock was successfully hatched out on the 19th March, 1912, and the gradual development of the head appendages of the young animals was kept under observation for a period of seven weeks during which they passed through the form characteristic of *A. corrugata* into that distinctive of *A. Cocksii*.¹

At no time during the development of these eggs was any trace of shell or veliger stage observed. The young

¹ For further details as to the behaviour of *A. Cocksii* in the early stages of its development after leaving the egg, see Colgan '12.

Actaeonias when they left the egg differed from the adult in little more than size and the absence of tentacles. This striking peculiarity, the absence of any larval metamorphosis in the development of *A. Cocksii* was pointed out by Pelseneer in his paper *La Condensation embryogénique chez un Nudibranche* in which the embryology of the species is lucidly described and figured.¹

Sub-Order—NUDIBRANCHIATA.

Aeolis papillosa (Linné).

Not infrequent living under stones about low-water mark; occasional in dredgings. "Three individuals were found by Dr. Lloyd at Malahide; also found by myself at Lambay Island": *Thompson* '40A. Fifteen specimens taken in 10 gatherings at Lambay, at Rush, at Skerries, and at Bullock, 1906-14; 1 dredged in 10 f. at Bullock, 1906, and another in 14 f. off Howth Head, 1907: N.C. Largest, 62 mm. long.

This species, as is probably the case with many others of the Aeolidian nudibranchs, travels by floating with the tide, as well as by crawling. At Rush in May, 1906, I saw a large individual drifting in rapidly with the tide, half floating and half swimming with a wriggling motion of the body. The number of embryos in the egg varies considerably. Alder and Hancock (*Monograph*) give the number as 2 or 3. Pelseneer (*Embryologie des Gastropodes*²) says there are normally 3 or 4, that sometimes 5, 6, 7 or 8 are found, and that once he observed 12 in a single egg. On the Dublin coast 3 appears to be the normal number; but in a coil taken at Skerries in 1913, I found the number to vary from 3 to 7 in each egg, the usual number being 6.

In three individuals, respectively, 25, 50, and 65 mm. long when in motion, the number of teeth in the radula

¹ *Travaux de la Station Zoologique de Wimereux*, vii. pp. 513-5201, 1899.

² *Mémoires de l'Académie Roy. de Belgique*. Ser. 2. Tome iii., 1911.

was found to vary from 18 to 24, and the denticles in the widest tooth of each from 40 to 47. In the largest, and presumably the oldest specimen, many of the denticles towards the centre of the widest teeth were distinctly bidentate and occasionally tridentate.

***Aeolidiella glauca* (Ald. and Hanc.).**

Eolis glauca.

Rare. One specimen trawled in 14-15 f. 3 miles east of Kingstown, May, 1907 : *Farran*, '09. Twice dredged in 14f. off Church Island, Skerries in July, 1913, one specimen in each haul, both 22 mm. long : *N.C.*

The radula in these specimens agreed well in its general form with Alder and Hancock's figure ; but the denticles in the majority of the teeth were more numerous, ranging from 35 to 46 in each half of the double arch. The teeth numbered 19 in one specimen and 21 in the other. In captivity the last-named specimen spawned while floating foot upwards on the water surface. The ribbon was .75 mm. wide and 135 mm. in length when opened out, a rough calculation giving for the coil a total of 11,000 eggs.

***Ae. Alderi* (Cocks).**

Eolis Alderi.

Rare. A single specimen 30 mm. in length, found under a stone at low tide, Dalkey Island, May 16, 1913 : *Colgan*, '13A. Another, 20 mm. long, taken here in April, 1914 : *N.C.*

This species is very similar to its congener *Ae. glauca*, and doubts as to their distinctness have been expressed by more than one authority. The best discriminative character is found in the radula, not so much in the form of that organ as in its numerical relations. While *Ae. glauca* has about 20 teeth with from 33 to 46 denticles in each half of the double arch, *Ae. Alderi* has usually but 15 teeth, with from 23 to 25 denticles. These differences might very well arise from differences of age and development in individuals of one and the same species. Yet since the specimens of the supposed two species of *Aeolidiella* here recorded appeared to have reached about the same stage of development,

it is reasonable to infer that the differences in their radulae are permanent. So, for the present, at least, it seems inadvisable to fuse the two species.

***Cratena amoena* (Ald. and Hanc.).**

Eolis amoena.

Rare. Dredged four times off Skerries and Dalkey, a single specimen in each dredging, in 13 f. off Church Island, August, 1911, in 2 f. off Colt Island, and in 14 f. off Church Island in July, 1913, and in 14 f. south of Dalkey Island in the same year and month: *Colgan*, '13A.

All of the specimens agreed in form with Hancock's plate in the *Monograph*, though in none was the colour of the papillae so distinctly green. It varied from dull brown to sage green. The brown band on the rhinophores was present in all, and the radula agreed closely with the figure in the *Monograph*, the number of teeth in a 5 mm. specimen examined being 16, and in a 6.5 mm. specimen, the largest taken, 20. The horn-coloured buccal bulb showed clearly through the pellucid tissues of the body, and the hepatic branches seen passing along the back into the papillae formed a pale coloured zig-zag pattern resembling, though less conspicuous, that so distinctive of *Tergipes despectus*. In the largest specimen a monstrosity appeared in the fusing for one-third of their length of two of the larger papillae, the free ends diverging in a wide fork.

***C. viridis* (Forbes).**

Eolis northumbrica (Ald. and Hanc.)

Rare. Dredged twice off Church Island, Skerries, in from 13 to 14 f., once in August, 1911, when 4 specimens were taken, the largest 6 mm. long, and again in July, 1913, when a specimen 5 mm. long was taken: *Colgan*, 13A.

In form and colour these specimens agreed well with Hancock's figure in the *Monograph*. The radula of the 5 mm. specimen was examined. It was long and slender, and made up of 35 teeth, each with about 5 denticles on either side of the slightly prominent median denticle, which

arose far back on the tooth plate so as to give the appearance of a hinder projection. The channelling of the tooth plates, each of which bears a lateral depression on its face for the reception of answering projections on the neighbouring plate, is not well shown by Hancock. It appears clearly in Sars' plate of a congeneric species, *Cratena olivacea*, Tab. xvi., pl. 8, *Moll. Reg. Arct. Norveg.*

Observed under a low power, the green colour of the papillae in this species and of similarly coloured lines on the body was seen to be due to the granular contents of the hepatic vessels. At intervals a rapid streaming of these green granules from the papillae into the hepatic ducts and *vice versa* could be made out with the greatest clearness, and on one occasion this stream of granules was observed to pass from one of the papillae through the body and out through the vent. After a time the papillae and the hepatic vessels of the body lost much of their green colour and faded to a yellowish white, while the watch glass in which the animals were kept became thickly strewn with green granules.

***Tergipes despectus* (Johnston).**

Eolis despecta.

Locally abundant, chiefly on hydroids in shallow water and in association with *Galvina exigua*. In Kingstown Harbour: *Haddon*, '86. In the shallow channel between Shennicks Island and the mainland at Skerries this species occurs in abundance on *Obelia dichotoma* which is found there thickly investing the floating tips of the common sea-weed, *Chorda filum*. In August, 1911, I took 63 specimens here, in July of the following year, 176, in July, 1913, 114, and in July 1914, 291, as many as 220 in a single gathering: *N.C.* Largest 6 mm. long.

The body of this nudibranch is very pellucid. In some individuals examined in 1912 the granules could be seen streaming up and down within the papillae, and the radula working to and fro as the *Obelia* heads were drawn in and devoured. The papillae in most of the specimens numbered only from 5 to 6, and were capable of change of form to a

remarkable degree. The tail is very long and flexible, and acts most effectively as a prehensile organ. The colours are so admirably protective that it is almost impossible to detect the animal when at rest, so well do its tints harmonize with the capsule-bearing *Obelia* on which it feeds. Its presence is usually betrayed by the numerous white egg-clusters, for the species spawns with great freedom. No less than 70 distinct kidney-shaped clusters were counted in July, 1913, on an 18mm. length of *Chorda filum* clad with the *Obelia*, and an individual isolated on the 12th July of that year laid 5 distinct egg-clusters within 48 hours. Examination of the radula in 9 specimens from 2 to 4 mm. long showed that the number of teeth ranged from 16 to 25.

***Embletonia pallida* (Ald. and Hanc.).**

Rare. In August, 1911, while examining some hydroids collected off Shennicks Island, Skerries, I detected two specimens of *Embletonia*, one 2.5 mm. the other 2 mm. in length, associated with *Tergipes despectus* and *Galvina exigua* on *Obelia dichotoma*. The larger specimen had on either side of the body a double row of yellow papillae tipped with orange, those towards the central part much longer than the others; the smaller specimen was a pale whitish yellow in colour, and bore only a single row of papillae on either side. The first agreed in form and colour with Alder's original description of *E. pallida* in Jeffreys' *Conchology*, vol. v., 1869, and differed only in its brighter coloration from Hancock's figure of that species given in Part VIII. of the *Monograph* (Ray Socy., 1910); the second agreed perfectly with that figure in colour, but differed from it in the absence of a second row of papillae. The larger specimen may safely be referred to *E. pallida*, and the smaller may perhaps have been an immature state of the same species: *Colgan*, '13A.

In the *Fauna der Kieler Bucht* of Meyer and Möbius, 1865, this species is recorded with a figure and full description, and the record has been accepted by Alder in his account of the British Nudibranchs in Jeffreys' *Conchology*, 1869.

From the figure and description of Meyer and Möbius it would appear, however, that the Kiel Bay Embletonia belongs to a different species, since the head appendages are quite distinct in form from those of *E. pallida* as figured by Hancock (*loc. cit.*)

***Amphorina caerulea* (Montagu).**

Eolis caerulea.

Rare. Two specimens dredged in 2 f. in Malahide River, one in August, 1907, the other in July, 1908: *Colgan*, '08 and '09. One in 13 f. off Skerries, August, 1911, *N.C.*

***A. aurantiaca* (Ald. and Hanc.).**

Eolis aurantiaca.

Rare. A single specimen 6 mm. long taken on the sponge *Halichondria panicea* in about 2 f., Malahide River, June, 1908: *Colgan*, '09. This specimen was quite as highly coloured as that figured by Hancock in the *Monograph*, and stood out a brilliant orange red from the yellow sponge to which it clung. In only two minor points did it differ from Hancock's plate: the rhinophores were more conspicuously wrinkled, and the tips of the papillae were white not orange, as has been noticed in specimens taken in Valentia Harbour, at Plymouth, and in the Isle of Man (*Beaumont*, 1900, p. 836). The animal, which lived in captivity for 5 days, was rather sluggish. It has been taken in the Irish Sea off the Dublin coast, but outside of the 3 mile limit in from 19 to 27 f., 1907: *Farran*, '09.

***Galvina exigua* (Ald. and Hanc.).**

Eolis exigua.

Not infrequent; usually between tide-marks. Kings-town Harbour: *Haddon*, '86. One specimen in a rock pool Rush Harbour: *Duerden*, '94. Found associated with *Tergipes despectus* on *Obelia dichotoma* in the channel between Shennicks Island and the mainland, July-August, 1910-14, 80 specimens taken, 2 to 12 in a gathering: *N.C.*

All of the mature Skerries individuals agreed perfectly in colour and in general form with Hancock's plate in the

Monograph, but the papillae were fewer, in no case exceeding 10. Many of the juveniles were colourless, save for the papillae which had creamy hepatic lobes. A specimen isolated on the 25th July, 1912, laid 4 distinct egg-clusters within 24 hours. According to Meyer and Möbius the species attains to 21 mm. in the Kieler Bucht. My largest specimen was 6 mm. in length, and in 4 specimens examined the number of rows of teeth ranged from 38 to 52.

G. tricolor (Forbes).

Eolis tricolor.

Frequent in dredgings all along the coast in from 8 to 17 f.; quite absent from the littoral zone. About 20 specimens taken in 14 f. between Burford Bank and the Bailey Light, Howth, and 28 specimens in 10 f. off Dalkey, July, 1907: *Colgan*, '08. One specimen in 10 f. off Bullock in April, and another in 14 f. off Skerries in July, 1908: *Colgan*, '09. Taken in 15 other hauls in from 2 to 17 f., 1911-14, a total of 55 specimens: *N.C.* Largest, 39 mm. long.

One of the most plentiful nudibranchs of the Irish Sea between 10 and 42 f.: *Farran*, '09.

G. Farrani (Ald. and Hanc.).

Eolis Farrani.

Locally abundant near low-water mark on *Obelia dichotoma*, investing *Zostera marina*, *Chorda filum* and *Laminaria saccharina*. "A single specimen of this pretty species was found with the preceding" [*Eolis alba*, taken at Malahide, 1843]. "We have named it after Dr. Farran of Dublin, a gentleman well known for his love of natural history. To his kindness we are indebted for the opportunity of procuring these interesting additions to the British fauna": *Ald. and Hanc.*, '44. Four specimens on *Zostera* at Shennicks Island, July, 1908: *Colgan*, '09. Common in the channel between Shennicks Island and the mainland, where 154 specimens were taken, 1907-13, as many as 28 in one gathering, the largest 23 mm. long: *N.C.*

In its Dublin head-quarters off Shennicks Island this species is highly variable in colour. The white form with

orange-tipped papillae (figured in the *Monograph*) is by no means so common there as forms suffused all over the body with orange tints of varying intensity. Another frequent colour form is one freckled or mottled with brown on the body, the papillae, and the rhinophores, this colour being associated on the back with spots and blotches of deep orange. The orange tips to the papillae are almost always present, yet two specimens, cream-coloured in the body, were found to have pure white papillae with colourless tips. Monstrosities were noticed in three individuals. All of these bore one or two forked papillae, and one a further monstrosity in the shape of a forked oral tentacle. The forked papillae were in all cases due to the fusing of two adjacent papillae, as was evident from the presence of double hepatic lobes, parallel below and diverging into the terminal forks.

The species continues to spawn at intervals for several days. One individual isolated on the 6th July, 1913, laid 5 distinct egg coils by the 14th July: another isolated on the 22nd of the same month laid 4 coils within 24 hours. The colour of the eggs varied from pure white to cream, and in one instance to a very pale pink. On the 17th July, 1913, I had an opportunity of watching from start to finish, the operation of spawning as carried on by a full-grown specimen floating foot upward in a glass dish. The emission of the ribbon was not continuous, but intermittent, by a series of muscular efforts, each marked by a twitch or jerk of the animal's head. The coil reached the water surface through a deep sinus in the flexible foot margin, the body being throughout bent into a crescent shape. The whole operation occupied 30 minutes, and the egg ribbon when finally laid and left floating on the water surface was disposed in a coil and a half which, opened out, had a length of 11 mm. The successive stages of egg deposition were clearly marked in regular frillings or indentations of the mucous envelope of the coil, a feature which is apparent also in *Galvina exigua* and less clearly in *Doto coronata*. I observed egg deposition in one instance to take place in from 15 to 20 hours after pairing.

Doubts have more than once been expressed as to the distinctness of this species from *G. tricolor*. In spite of many points of agreement with that species, it certainly differs from it in general aspect and colour as well as in habitat. The present species appears to be almost exclusively littoral, while *G. tricolor*, which is larger and more clumsy in its proportions, appears to be confined to fairly deep water. The most obvious distinction is in colour, the violet tints which are almost invariably present in *G. tricolor* being absent from all of the numerous specimens of *G. Farrani* taken at Shennicks Island. To these colour distinctions, which in themselves are insufficient as specific characters, may be added certain anatomical distinctions of perhaps greater value. An examination of the radulae and jaws of 12 specimens of *G. Farrani* and 10 specimens of *G. tricolor* showed that the teeth in the first species ranged from 35 to 54 in number with an average of 42, in the second species from 60 to 80 with an average of 68. A large specimen of *G. Farrani* had 40 teeth in the radula, while a much smaller specimen of *G. tricolor* had 60. These differences would appear, then, to be constant and not due to different stages of development in two colour varieties of one and the same species. In the form of the mandible edges, too, (the *Kaurand* of Bergh) a further distinction was noticed. The armature of the edge in *G. Farrani* was more distinctly dentate than in *G. tricolor* in which the edge was broken by a series of prominent tubercles rather than the row of deep-cut, flat-topped teeth which appeared in *G. Farrani*, and are well figured by Bergh (*Beitr. zur Kenntn. der Æolid.*, v., 1878, Taf., xiii). On the whole, then, *G. Farrani* seems to be entitled to specific rank.

***G. picta* (Ald. and Hanc.).**

Eolis picta.

Apparently rare. A single specimen taken at Malahide (Mr. Alder and Dr. Farran) *Thompson*, '44. One specimen dredged in 12 f. off Church Island, Skerries, July, 1908: *Colgan*, '09. Taken in 8 hauls off Skerries and Dalkey, 1912-14, in from 8 to 14 f., a total of 19 specimens the largest 7 mm. long: *N.C.*

A small papilla thrown off by this 7 mm. specimen continued for 24 hours to make automatic vital movements. The radula in this specimen had 48 rows of teeth, and all of the Dublin specimens agreed perfectly in colour with Hancock's plate in the *Monograph*.

***Coryphella rufibranchialis* (Johnston).**

Eolis rufibranchialis.

Rare? Dublin Bay, not uncommon: *Hassall*, '42. Two juvenile specimens 5 mm. in length dredged in 10 f. off Skerries, July, 1912: *N.C.*

***C. gracilis* (Ald. and Hanc.).**

Eolis gracilis.

Not infrequent. Dredged six times in July, 1913, five times off the Skerries islands in from 2 to 15 f., a total of 10 specimens, and once in 14 f. off Dalkey, a single specimen. The specimens ranged in length from 3 to 6 mm., and the papillae were a clear orange rather than the reddish brown tint shown in Hancock's plate. One specimen, 13 mm. in length and spawning taken on *Halecium halecinum* in 5 f. off Kingstown East Pier, May, 1914: *N.C.*

The rows of teeth in the radulae of three specimens dissected varied in number from 10 to 14. There were usually 5 denticles on either side of the large median teeth, and from 6 to 8 in the laterals. The spawn coil of the largest specimen measured 25 mm. when extended with a width of hardly 1 mm. and was constricted at intervals like the coil of *Eolis papillosa*. The eggs which were arranged usually in 4 rows, numbered on a rough count 1,500 for the whole coil. The rounded-elliptic otoliths were found to be about 25 in number.

***C. Landsbergii* (Ald. and Hanc.).**

Eolis Landsburgii.

Rare. Of this species, perhaps the most beautiful of all our Eolids, a juvenile specimen 5.5 mm. long was dredged in Malahide River attached to the common sponge *Halichondria panicca* in about 2 f. in September, 1911, and another,

a mature specimen 20 mm. long, was taken in 7 f. in Dalkey Sound in May, 1913: *Colgan*, '13A.

In form and in delicate amethystine colour both of the specimens here recorded were precisely similar to Hancock's figure in the *Monograph*. The oral tentacles were distinctly longer than the wrinkled though not perfoliate rhinophores.

***C. lineata* (Lovén).**

Eolis lineata.

Rare. Kingstown Harbour: *Haddon*, '86. One specimen (probably this species) in a rock pool, Lambay (H. J. B. Wollaston) *Colgan*, '07. Off the Dublin coast, but outside of the 3 mile limit Mr. Farran finds this species to be not uncommon in from 15 to 44 f.: *Farran*, '09.

***Favorinus albus* (Ald. and Hanc.).**

Eolis alba.

Rare. "This is an extremely graceful animal. Two specimens were obtained" [at Malahide in 1843]. *Ald. and Hanc.*, '44.

Not found within the Dublin coast limits since its original discovery at Malahide, the *locus classicus* of the species.

***Facelina Drummondi* (Thompson).**

Eolis Drummondi.

Not infrequent. In Kingstown Harbour: *Haddon*, '86. Two specimens in Malahide River in about 2 f., one in June, the other in November, 1908; 8 specimens in 6 f. off Colt Island, Skerries, and 1 on *Zostera* at low water, Shennicks Island, July, 1908: *Colgan*, '09. One specimen at low water, Shennicks Island, 1910, and another at Red Island, 1913; taken in 5 hauls off Dalkey and Skerries, 2-14 f., 1912-13, a total of 7 specimens: N.C. One specimen in 9-12 f., 3 miles east of Balbriggan, and another off Ireland's Eye, 1902; taken also in the Irish Sea at a depth of 43 f. in Lambay Deep: *Farran*, '09.

The largest Dublin specimen, one 29 mm. in length taken off Colt Island, showed a monstrosity in a distinctly forked papilla. In captivity this species is remarkably active,

the rhinophores, the long labial tentacles, and the papillae being kept in constant, rapid, serpentine motion. The papillae when thrown off or detached from the body of the animal retain their vitality for a long time. In one instance a papilla thrown off at 12 noon on the 25th July, 1908, continued, without external stimulus, to make automatic vital motions up to 8.30 on the following morning, or for a period of 20½ hours. When another detached papilla of the same species was cut into two parts the upper part continued for 21 hours to manifest automatic motions similar to those effected by the detached but undivided papilla. For a gastropod, this animal is quite a rapid climber and crawler. A specimen which had suspended itself by a slime thread 2 inches below the water surface was seen to remount to the surface in one minute by climbing the thread, and, crawling up the side of a glass tube, it covered one inch in 13 seconds (*Colgan*, '09A).

A spawn coil of this species laid in captivity, somewhat in the form of the Grecian key pattern as shown in Hancock's plate in the *Monograph*, was found to measure 7 inches (175 mm.) in length by barely 1 millimetre in width when stretched taut. The number of teeth in the radulae of 3 well grown Dublin specimens dissected was found to range from 13 to 16; the otocysts contained very numerous (from 75 to 100) otoliths of two forms, about a dozen large and ovate, the remainder round and hardly one-third the size.

F. coronata (Forbes and Goodsir).

Eolis coronata.

Not infrequent within tide marks. "Found to be common at Malahide by Mr. Alder and Dr. Farran": *Thompson*, '44. Several specimens on *Halidrys siliquosa*, at Rush: *Duerden*, '94. One specimen, Lambay: *Colgan*, '07. Under stones at Lough Shinny, at Shennicks Island, and at Red Island, Skerries, eleven specimens taken, 1906-11: *N.C.*

Antiopa cristata (Della Chiaje).

In dredgings, rare. One in 10 f. off Bullock, September, 1906: *Colgan*, '07A. Three in 9 f., Dalkey Sound, 1908: *Colgan*, '09. One in 2 f. Malahide River, September, 1911.

and 2 off Skerries, July, 1912, one in 12 f., the other in 16 f. : N.C. One specimen in from 9–12 f., 3 miles off Balbriggan, 1907 : *Farran*, '09.

The largest of my Dublin specimens was 31 mm. in length and all agreed well with Hancock's figure in the *Monograph*. The body was pellucid allowing the valvular action of the heart to be seen both from the foot and the back. The slender hepatic branchings, too, were visible through the body, and were seen to start from in front of the rhinophores. Numerous bright orange copepods similar in form to those inhabiting the branchial plumes of many Dorids were found clinging to the papillae. These were probably *Lichomolgus doridicola*.

A. hyalina (Ald. and Hanc.).

Rare. Three specimens were dredged in 10 f. off Bullock in September, 1906 : *Colgan*, '07A.

Proctonotus mucroniferus (Ald. and Hanc.).

Rare. A single perfect specimen and another much injured obtained by dredging in shallow water at Malahide in September, 1843, adhering to the common sponge *Hali-chondria panicea* : *Ald. and Hanc.*, '44, and *Monograph*. Two specimens, $\frac{1\frac{3}{16}}$ inch (21 mm.) under a stone at Malahide : *Haddon*, '86. A single specimen 9 mm. in length and paler in colour than that figured in the *Monograph* occurred to me in a dredging made in 12 f. off Dalkey Island in August, 1913 : N.C.

This appears to be one of the rarest Nudibranchs of the British Isles. So far as I can ascertain, within the 70 years which have elapsed since it was first discovered at Malahide only seven individuals have been placed on record for the Britannic marine area, and six of these are for Irish stations. The Britannic distribution as at present known is the following : Dublin, two stations, Malahide and Dalkey ; Galway, Ballinakill Harbour ; Lamlash Bay, Arran, in the Clyde area. In captivity the Dalkey specimen was observed to assume the peculiar attitude noticed by Mr. Farran at

Ballinakill, the animal as it floated on the water surface being coiled into a close ring with the papillae extended radially so as to simulate an Actinia.

***Lomanotus marmoratus* (Ald. & Hanc.).**

L. Genci Verany. *L. portlandicus* Thompson; *L. Hancocki* Norman; *L. flavidus*, Ald & Hanc.

Not infrequent in dredgings in from 10 to 18f. One large specimen 45 mm. long and translucent rosy orange in colour dredged in 10f. off Bullock in October, 1906: *Colgan*, '07a. Twice dredged off Church Island, Skerries, four specimens, ranging from 4 to 12 mm. in length, in 13f., August, 1911, and seven others, one 6 mm. long, the others ranging from 1.5 to 2.5 mm. on Antennularia in 14f. July, 1912; *N.C.* One specimen, a mile south-east of Ireland's Eye, 13-18f., 1902, and another in 14-16f. two miles off Dalkey, 1903: *Farran*, '09 (as *L. portlandicus*).

In addition to the two last-mentioned stations, Mr. Farran has dredged a large *Lomanotus* which he refers to *L. portlandicus* no less than nine times in the Irish Sea outside of the Dublin three-mile limit, and chiefly in or about Lambay Deep. Some 20 specimens ranging up to 33 mm. in length and usually of a whitish colour suffused with orange red were taken between 1902 and 1907 at depths ranging from 20 to fully 48f. (*Farran* '09.)

Although a good deal of attention has been given of late to the interesting genus *Lomanotus*, opinion is still much divided as to the number of species to be admitted. Large and small forms which differ markedly in coloration without offering any constant satisfactory distinctions in form or structure occur not infrequently within the Britannie marine area, and it has been suggested that the small forms, which in general aspect fall under either *L. marmoratus* or *L. flavidus*, should be regarded as immature states of the larger forms which are usually assigned to *L. Genci*, equated with *L. portlandicus* and *L. Hancocki*. A recent authority, W. Garstang, reduces all six European species of the genus to one, fusing with the five species

already mentioned, the Mediterranean *L. Eisigii* of Trinchese (*Journ. Marine Biol. Assoc.*, vol. i., p. 185-9, 1889). Another authority, W. I. Beaumont, admits two species, one *L. Genei*, including all the large, the other, *L. marmoratus* all the small forms (*Beaumont*, 1900). Again, Sir C. Eliot, in his Notes on some British Nudibranchs (*Journ. Marine Biol. Association*, vii., 1906), accepts provisionally three species, one, *L. Genei* for the large forms, two others, *L. marmoratus* and *L. flavidus*, for the small. The present writer in the belief that the extension of the pallial margin into a caudal, fin-like process in *L. portlandicus* and *L. Eisigii*, might be a sufficient specific character, united these into one species under the name *L. portlandicus*, while referring all the other forms, large and small, to a second species for which he retained the name *L. marmoratus* as having priority over *L. Genei* (Colgan, '08B). Finally, G. P. Farran, influenced chiefly by marked numerical differences which he has detected in the divisions of the radulae, allocates the large Irish specimens to two species, one *L. portlandicus* for the Eastern or Irish Sea form, the other, *L. Genei*, for the dark coloured Atlantic or west Irish form. Sir C. Eliot (Part viii. *Ald. & Hancock's Monograph*, Ray Soc., 1910) failing to find the differences pointed out by Farran, does not admit their constancy and continues to regard *L. Genei* and *L. portlandicus* as one species.

As for the eleven small and presumably immature specimens taken at Skerries in 1911-12, they fall under three of the described species which are here, provisionally at least, fused into one. Two specimens, one 4 mm., the other 12 mm. in length, with brown marblings on a whitish ground, agreed closely in general aspect with *L. marmoratus*; a third, 7 mm. long, in colour light yellow with brown flecks on the papillae, agreed perfectly in form and colour with *L. flavidus*; seven others, the small specimens taken in July, 1912, ranging from 1.5 to 6 mm. in length, and translucent white flushed with pink, were clearly juvenile states of the large Irish Sea form referred by Mr. Farran to *L. portlandicus*, a form with which the large Bullock specimen of 1906 agreed perfectly. The last or eleventh of the small

specimens was intermediate in colour between *L. flavidus* and *L. marmoratus*. The publication by Sir Charles Eliot (Part viii., *Monograph*) of Hancock's figure of *L. portlandicus* convinces me that I was not justified in regarding the caudal extension of the pallial margin there shown as a sufficient specific character. This species is accordingly merged here with the other Britannic species of the genus under the name *L. marmoratus* which has priority.

As shewing the wide range of variability in the radula due merely to age, it may be of interest to note here that an individual 2.5 mm. in length (one of the seven juveniles taken at Skerries in 1912), yielded on examination the dental formula $20 \times 6-0-6$, as contrasted with the formula $40 \times 58-0-58$ given by one of Mr. Farran's Irish Sea specimens 33 mm. long. In the juvenile Skerries specimen, the number of teeth in the first of the 20 rows was but 2 on either side of the centre, increasing to a maximum of 6 on either side in the 20th row. The larger teeth bore on either side from 10 to 12 denticles against 25 found by Eliot in the teeth of a mature Plymouth specimen. The jaw tessellations in the juvenile Skerries specimen were perfectly formed, the outer slightly curved edge of each tessellation being minutely and regularly dentate or rather crenate.

On the whole, the evidence at present available would appear to warrant the conclusion that we have in Britannic waters but one highly variable species of *Lomanotus* which presents itself in two leading forms or colour varieties. If *L. flavidus* should prove to be a mature form, and not, as there is good reason to believe, a juvenile, then it may be entitled to rank as a distinct species.

***Doto coronata* (Gmelin).**

Locally abundant in shallow water dredgings and between tide marks ; occasional in deeper water. Found in Dublin Bay by Mr. Alder ; *Thompson*, '44. In 2f. in Malahide River, June, 1908, 33 specimens on *Hydrallmania* ; *Colgan*, '09. Taken in 30 dredgings in from 2 to 15 f. at Skerries,

Dalkey and Malahide, 1906-14, a total of 98 specimens, as many as 39 in one haul in 2 f. off Skerries; in 13 shore gatherings at Shennicks Island, Skerries, 1906-13, a total of 207 specimens collected or noticed, 90 being counted in the course of an hour's collecting in July, 1913, the majority on *Obelia dichotoma* investing *Chorda filum* and *Laminaria saccharina*; N.C. Largest 12.5 m.m. long.

Though usually with pink markings, many specimens were taken of almost pure cream colour. Individuals only 4 m.m. in length were found spawning. The readily detached papillae of this species when cast off by the animal displayed independent vital motions, quite as remarkable for their persistence as those already noticed under *Facelina Drummondi*. One papilla detached at 3.40 pm. on the 24th July, 1908, from a specimen dredged off Skerries continued to make periodic automatic movements up to 11 a.m. on the following day, or for upwards of 19 hours, these movements not being confined to the papilla as a whole, but extending to each of its black-tipped tubercles. After swimming for some time on the surface in the dish of sea water, where it progressed by a series of twitches or spasms, the papilla sank to the bottom and resting there erect on its base proceeded at intervals to nod or bow with a curious simulation of purposeful action its body swinging through an angle of some 30 degrees, while the tubercles carried on a proper motion of their own.

On examination of the radulae of six specimens from 3 mm. to 5.5 mm. in length the number of teeth was found to range from about 70 to 110. In all six the mouth cavity underneath the radula contained loose teeth from 5 to 15 in number. Bergh found up to 21 of such loose teeth in *D. fragilis* (*Beitr. zur Kenntn. der Æolid.* ix. p. 27, 1888).

D. fragilis (Forbes).

Not infrequent in dredgings. One specimen on Antennularia in 8 f. off Chu ch Island, Skerries, 1908; Colgan, '09. Taken in five hauls in from 2 to 15 f. off Skerries, July,

1912-13, a total of 17 specimens, all on Antennularia, N.C. Several Specimens on Halecium inside of Burford Bank, 1904, and one specimen in 14 f. a quarter of a mile off Howth, 1907; *G. P. Farran*. Largest 30 mm. long.

In three specimens examined the number of teeth in the radula was found to vary from 75 to 110, each tooth bearing on either side of the median cusp four blunt denticles.

***Dendronotus frondosus* (Ascanius).**

D. arborescens.

Frequent in dredgings in from 2 to 18 f. Several specimens taken by Mr. Alder and Dr. Farran at Malahide; *Thompson*, '44. One specimen in 14 f. off Howth Head and another in 6 f. in Lambay Sound; *Colgan*, '08. Taken in 15 hauls at Malahide, Skerries, and Dalkey in from 2 to 18 f., 1906-13, a total of 21 specimens, the largest 27 mm. long. On the 25th May, 1908, a very fine specimen of this species fully 89 mm. ($3\frac{1}{2}$ inches) long was brought to me by a Bullock fisherman who had found it that day in one of his lobster pots sunk off the harbour at a depth of 5 fathoms. I can find no larger specimen on record.

The radula was examined in three specimens, *a*, *b*, and *c*, respectively, 10 mm., 25 mm., and 89 mm., in length, with the following results: (*a*) 38 rows of teeth with 8 to 10 uncini on either side; (*b*) 40 rows with the uncini equal in number to those of (*a*); and (*c*) 30 rows with 10 to 11 uncini. Here a departure from the general rule of increase in the number of teeth with increase of age and size of the animal was exhibited, the very large Bullock specimen having 8 rows of teeth less than were found in the small, 10 mm. specimen. The large specimen, a giant for its species, had no doubt reached the age, seldom, perhaps, attained by a nudibranch, when the growth of new teeth has either ceased or become too feeble to balance the loss by wear of the old teeth. In this old specimen too, a remarkable change in the form of the uncini was

noticed. Their tips were quite smooth-edged, though in the younger and smaller individuals (*a*) and (*b*), they were sharply denticulate. The mandible-edges, armed with a row of tubercles in the smaller specimens had, like the uncini, become quite smooth in the large specimen.

***Tritonia Hombergii* (Cuvier).**

Rare. "A specimen about 4 inches in length, with the examination of which I have been favoured by Mr. Ball, was dredged with oysters some years ago at Howth": *Thompson*, 40 A. A single specimen in deep water, Dublin Bay: *Hassall* '42. One specimen in 10 f. off Bullock: *Colgan*, '08—this specimen lived in captivity for more than a month, feeding on *Antennularia*. Taken in association with *Alcyonium digitatum* in two hauls in 14 f. off Church Island, Skerries in July, 1913, a total of three specimens, 1 mature, 92 m.m. long, the others juvenile, nearly pure white and from 10 to 15 m.m. long.

In the large Skerries specimen the buccal mass was found to be of relatively enormous size, measuring fully 18 mm. × 11 mm., and occupying nearly one-third of the body cavity. The radula had 70 rows of teeth, the widest having 220 uncini in each half row. The coarse serrations of the mandible-edges in this specimen were not simple, but made up of aggregations of smaller teeth which in the younger specimens were arranged in several rows as in the adult *T. plebeia*.

***T. plebeia* (Johnston).**

Rare. Four specimens, the largest 18 mm. in length, found nestling at the foot of a large mass of *Alcyonium digitatum* attached to an old *Pecten* shell dredged in 14 f. off Church Island, Skerries, July 27th, 1912: *Colgan*, '13A. Three specimens, the largest 20 mm. in length, dredged in a'most the same locality as the preceding in July, 1913, in a dredging which contained many specimens of *Alcyonium digitatum*.

The radula shewed the usual variations due to growth. In a specimen 6 mm. in length, it was made up of 26 rows with 50 uncini on either side of the widest row ; in one of 20 mm. it had 38 rows with up to 70 uncini in each half of the widest row. The mandible-edges were armed with from 4 to 5 rows of tubercular teeth.

Doris testudinaria (Ald. & Hanc.)

Two specimens of this species occurred to me under stones at low-water mark, Skerries, in July of the present year. When in motion the animals measured respectively 50 mm. \times 25 mm. and 65 mm. \times 32 mm., with a height ranging from 10 to 12 mm. Compared with other Dorids, they were very active, progressing with a beautifully smooth, gliding motion, unaccompanied by the slightest undulation of the cloak margins, at the rate of fully 66 mm. or rather more than $2\frac{1}{2}$ inches per minute.

Both specimens agreed well in form and colour with the large Plymouth specimen (A.) described by Sir C. Eliot at p. 102 of his Supplement to Alder and Hancock's *Monograph*, but the underside of the Skerries specimens were not white, but a rich yellow. A hasty dissection of one of the specimens showed that it was destitute of labial armature, that the fragile, colourless radula had about 28 rows of teeth, that the minute otoliths numbered about 60 and that the cloak was stiffened by densely set granules and straight rods.

The larger specimen laid a small spawn coil in captivity, and two other and much larger coils were found alongside the animals when taken. Comparison of these with the smaller coil showed that they belonged to the same species. All three coils were of a dull cream colour : they were fixed by the edges and formed a frilled spiral similar to the coil of *Archidoris tuberculata*. The eggs were thickly and irregularly disposed in the ribbon, and the embryos in each egg were usually 2 in number though frequently 3 or 1. The largest coil when opened out and laid flat measured 290 mm. \times 14 mm., and a careful estimate, made by the method here described in the case of *Archidoris tuberculata*, gave a total of fully 480,000 embryos for the whole coil.

In spite of superficial resemblances the present species is distinguished from *Archidoris tuberculata* by many characters. Of these the form of the tentacles and of the anterior lamina of the foot are in themselves sufficient. From *D. planata* of Ald. & Hanc. it appears to differ in little more than size and colour, and it may be that Alder is correct in holding that species to be the young of *D. testudinaria*. As an Irish species *Doris testudinaria* was first discovered by Mr. G. P. Farran in the spring of the present year (in West Ireland, on the shores of Blacksod Bay). It is now recorded for East Ireland, and further exploration will probably show that it extends all round our shores.

***Archidoris tuberculata* (Cuvier).**

Doris tuberculata.

Generally distributed but nowhere abundant under rocks and stones between tide-marks; occasional in dredgings. At Ireland's Eye (R. Ball & Thompson): *Thompson* '40A. A total of 42 specimens taken in 21 shore gatherings at Lambay, Skerries and Dalkey, 1906-14, from 1 to 4 in a gathering; one specimen in 2 f. Malahide River, 1907, another in 13 f. off Skerries, 1911, and a third in 14f., 1913: *N.C.*

The largest of the Dublin specimens taken was 4 inches long while in motion. Pure yellow forms are uncommon, the usual coloration being dull brown or pinkish blotchings on a buff ground. A pure yellow specimen was taken in the Malahide River attached to *Halichondria panicea* and assimilating very closely to the colour of the sponge. Though usually littoral, this species has been twice trawled at a depth of 22 f. in the Irish Sea (*Farran* '09). The radulae of seven specimens varying in length from 19 mm. to 60 mm. were examined. The number of rows of teeth was found to range from 27 to 45, while the laterals on either side in the widest row ranged from 36 to 70.

The size of the egg ribbon in this species and the number of included embryos is very much under-stated by many authorities. Alder and Hancock (*Monograph*) found the ribbon to measure "when uncoiled as much as nine inches

in length and nearly an inch in breadth, while the ova amounted to about 50,000," and quote Bouchard Chantereux as having found a coil 12 inches long with 80,000 ova in what appears to be a variety of the same species. Sir Charles Eliot (Part viii., Ald. & Hancock *Monograph*) says the coil may be as much as 15 inches long when extended. Four coils taken by me at Bullock and Dalkey Island in April, 1914, when opened out carefully without stretching were found to have lengths of 32 inches, 28 inches, $26\frac{1}{2}$ inches and 17 inches, respectively, with a breadth varying from $\frac{3}{4}$ to $1\frac{1}{3}$ inch. The number of ova in the longest of these ribbons was found to be fully 645,000, the calculation being made as follows. A piece of the ribbon exactly one-eighth of an inch square was cut out and subjected to gentle pressure between two glass slides so that the ova were well separated. Carefully counted, the ova in this piece were found to number 360. The total area of the ribbon was found to contain 1,792 pieces one-eighth inch square and, assuming the ova to be, as they appeared to be, quite evenly distributed in the ribbon, a simple multiplication gave the total as 645,120.

Darwin (*Voyage of the Beagle*, chapter ix., footnote) has calculated at 600,000 the number of eggs in the ribbon nearly 20 inches long of a Falkland Island *Doris* and gives this as an instance of the fallacy that the numbers of a species depend on its powers of propagation. Our native *D. tuberculata* offers an equally good illustration of the fallacy; for it is no more abundant than the Falkland Island species and much less so than, for instance, *Actaeonia Cocksii* whose egg clusters contain usually but a dozen eggs.

Jorunna Johnstoni (Ald. & Hanc.)

Doris Johnstoni.

Between tide-marks; rare. "In July last Mr. Hyndman procured a specimen of this *Doris* on Fuci at Skerries" *Thompson* '45 (sub. *D. obvelata*). Three specimens, the largest over two inches (50 mm.) long, under a rock at low tide, Dalkey Island, June, 1908: *Colgan*, '09. One specimen at Shennick's Island, Skerries, July, 1910, and another

at Red Island, July, 1913; two specimens each 38 mm. long at low water, Bullock, May, 1913, on *Halichondria panicca* and closely assimilating with the sponge in colour and texture: *N.C.*

On dissection, two specimens; one 15 mm., the other 30 mm. long, gave radulae with 15 and 20 rows respectively, the laterals on either side of the widest row numbering 20 in the smaller, and 27 in the larger specimen.

***Aegires punctilucens* (d'Orbigny).**

In dredgings, rare. Two specimens taken in 1907, one in November in 2 f. in Malahide River, another in December in 10 f. off Bullock: *Colgan*, '08. There is a specimen in Dublin Museum collected by R. Hanna at Howth in 1898: *Nichols*, 1900. One specimen 20 mm. in length taken in 2 f. in Malahide River, December, 1912: *J. Bayley Butler*. One specimen in 5 f. off Kingstown Pier, May, 1914: *N.C.*

This is a very sluggish animal in captivity. I have seen it remain motionless for two hours with rhinophores and branchial plumes fully extended, and the fastest rate of progression observed was one inch in 3 minutes. The radula in a mature specimen had 21 rows of teeth with about 20 uncini on either side in the widest row.

***Polycera quadrilineata* (Müller).**

Locally frequent between tide-marks; occasional in dredgings. Malahide and Dublin Bay: A. & H. *Monograph*, 1851. Salthill: *Haddon*, '86. Off Howth, 4 f.: *Nichols*, 1900. Between tide-marks off Shennicks Island, Skerries, 29 specimens, the largest 25 mm. long in motion, were taken in 9 gatherings on *Zostera*, *Fucus serratus*, and *Chorda filum* in the month of July, 1907, 1910, and 1913: *N.C.*

In only 2 of the Dublin specimens was any tendency observed to assume the black lineations which are usually borne by this species in the Kieler Bucht. These two specimens, taken at Skerries, were dotted and streaked all over the body with minute black markings which did

not, however, arrange themselves in lines. The number of rows of teeth in the radula of this species appears to vary but little with age. Taking the maximum number of half rows as the standard, for the number of such rows is not always equal on either side of the radula, 13 out of 14 Dublin specimens dissected were found to have 10, only one had 11. These specimens ranged from 6 mm. to 25 mm. in length. The smaller individuals had usually but 3 lateral plates with a rudiment of a fourth, the largest had 5. Bergh found the rows of teeth in 4 specimens to vary from 14 to 15; Meyer and Möbius found the usual number to be 12 or 13; and Alder and Hancock give 15.

P. Lessonii (d'Orbigny).

Frequent in dredgings, both the type and the variety *ocellata*. "Mr. Alder dredged 2 or 3 specimens of this species in Dublin Bay, August, 1843, along with *P. ocellata*": Thompson '44. Three specimens taken in 10 f. off Bullock and one in 8 f. off south side of Howth Head: Colgan '08. Dredged ten times in Dalkey Sound in from 7 to 14 f., 1906-13, a total of 17 specimens, N.C. The largest of my Dublin specimens was 29 mm. long.

Var. *ocellata*, Ald. and Hanc.—"Mr. Alder, by means of the dredge, took this species commonly and of all sizes in Dublin Bay in August last, and subsequently obtained a specimen at Malahide": Thompson, '44. Six specimens, taken in 9 f. off Bullock: Colgan '09. Dredged nine times off the Muglins and in Dalkey Sound in from 9 to 15 f. 1906-13, a total of 25 specimens: N.C. The largest specimen of this variety, one 14 mm. in length, laid in captivity in September, 1911, a spawn mass of $3\frac{1}{2}$ coils which was cream-white, not pink as is said by Alder and Hancock to be usually the case.

In 6 specimens of the type examined, the number of rows in the radula varied from 13 to 14, and the laterals from 5 to 7 in each half-row. The lateral plates are distinctly toothed at the tips as is well shewn by Meyer and Möbius in their plate iv. for the var. *ocellata*. These authors

found from 13 to 15 rows in the radula of the variety with from 5 to 7 laterals, while Bergh in 4 specimens of the type found from 16 to 18 rows with a uniform 8 laterals in all 4.

***Acanthodoris pilosa* (Müller).**

Doris pilosa.

Rather common between tide-marks, usually on *Fucus serratus*; frequent in dredgings. "The first Irish specimen of this *Doris* that I have seen was found in Dublin Bay by G. J. Allman, Esq." *Thompson* '40A. Very common round Salt Hill: *Haddon* '86. Frequent at low water, Skerries, Portrane, Malahide, and Sandycove, 1908-13, a total of 163 specimens taken, as many as 38 in a single gathering; dredged six times off Skerries, 1911-13, in from 2 to 15 f., a total of 20 specimens; one specimen dredged in 10 f. off Bullock, 1911: *N.C.* Largest 41 mm. long.

This species varies greatly in colour on the Dublin Coast as elsewhere. Several shades of brown are common and often assimilate closely with the *Fucus* on which the animal was found spawning freely in July, but shades passing from mouse-colour to light lavender and cream white are frequent. All of the deeper water individuals dredged off Bullock and Skerries in 10 f., 13 f., and 16 f. were pure cream colour with yellow rhinophores. On dissection of 12 Dublin specimens, ranging from 9 m.m. to 25 m.m. in length (in spirit), the number of rows in the radula was found to vary from 24 to 30; the lateral plates were 3 or 4 in number in each half row of the smaller specimens, and 5 in the largest. Bergh, in Alaskan specimens, found from 3 to 6, and Meyer and Möbius, in Kieler Bucht specimens, from 5 to 7 laterals in each half-row.

***Adalaria proxima* (Ald. & Hanc.)**

Doris proxima.

Two specimens each 11 mm. in length were dredged in Malahide River on the 10th December, 1912, by Professor Bayley Butler. This is the first Irish record for the species

which is closely similar in aspect to *Lamellidoris aspera* though quite distinct in the form of its radula. Originally placed under *Doris* by Alder and Hancock, it was made the type of a new genus, *Adalaria*, by Bergh in 1878: *Colgan* '13.

The radula of this specimen was found to be made up of 40 rows with from 8 to 9 lateral plates in each half row in addition to the large lateral spine.

***Lamellidoris aspera* (Ald. & Hanc.)**

Doris aspera.

In dredgings and between tide-marks, rather rare. "Mr. Alder procured specimens during an excursion in: December last with Dr. Farran of Dublin, to Malahide": *Thompson* '44. Two specimens at Lambay (H. J. B. Wollaston): *Colgan* '07. One specimen in 8 f. Dalkey Sound and another in 9 f. off Bullock: *Colgan* '08 and '09. One specimen in 9 f., Dalkey Sound, 1906; 1 at low water Sandycove, 1909; 1 in Malahide River, 2 f., 1911; and 2 off Bullock in 10 f., 1911-12: *N.C.*—Largest 8 mm. long.

***L. bilamellata* (Linné).**

Doris bilamellata.

Rather common in dredgings and between tide-marks. Between tide-marks on Lambay: *Thompson* '40A. In great abundance at Williamstown above low water mark: *Hassall* '42. Very abundant on stones, old shells, and boot-soles in 13 f. off the north side of Howth Head: *Colgan* '08. Abundant, chiefly on old *Lutraria* valves, in 5 f. off Skerries, where 47 specimens were taken in a single haul in July, 1907; also found abundant a few days later on flat stones at low water, Shennicks Island, Skerries, where as many as 15 juveniles were taken on one small stone; one specimen in 2 f., Malahide, 1908: *N.C.*—Largest 19 mm. long.

When dredged this species was usually found arranged in close groups of 3 or 4. The colour is usually brownish,

but occasionally almost white with brown branchial plumes. The number of rows of teeth in the radula of four specimens dissected varied from 22 to 25.

***L. inconspicua* (Ald. & Hanc.)**

Doris inconspicua.

Rare. Dublin Bay: *Wright* '59—the only record.

***Goniodoris nodosa* (Montagu).**

Frequent between tide-marks and in shallow water dredgings. "Between tide-marks at the island of Lambay, June, 1838": *Thompson* '40A. At Seapoint, in great numbers just below low-water mark: *Hassall* '42. "Mr. Alder found this to be plentiful at Malahide in 1843": *Thompson* '44. Salthill, fairly plentiful: *Haddon* '86. Twice dredged in Malahide River in 2 f., 1907, 9 specimens in August, and 2 in November: *Colgan* '08. One specimen in 9 f., Dalkey Sound, 1906; one at low water, Skerries, 1907, and 4 in from 8 to 10 f. off Bullock, 1912-13: *N.C.*—Largest 15 mm. long.

In a juvenile specimen 1 mm. in length, dredged in 10 f. off Bullock in August, 1913, the cloak margin, which is obscurely waved in the adult, was found to be deeply scalloped with 12 regular bays defined by sharp points. From each of these points a radial line ran almost to the centre of the back. These indicate the radial lines of spicules which are so distinct a feature in the adult.

***G. castanea* (Ald. & Hanc).**

Rare. One specimen agreeing perfectly in colour with Hancock's plate in the *Monograph* was dredged in 2 f. in Malahide River, November 16th, 1907: *Colgan* '08. This appears to be the only record for East Ireland. The specimen was 11 mm. long (in spirit), and the radula was

made up of about 28 rows. The lateral plates bore at the top a hooked tooth which distinguished them from the laterals of *G. nodosa* which are merely sinuate at top.

***Idalina aspersa* (Ald. & Hanc.)**

Idalia aspersa.

Rare. One specimen 22 mm. in length dredged on oozy bottom in 8 f., Dalkey Sound, July, 1908 : *Colgan* '09.

The radula of this specimen was found to have 35 rows of bright yellow teeth. Alder and Hancock give only 21 rows, but the specimen examined by them was probably a much smaller one of 12 mm. The labial armature was closely similar to that figured by Sars for *Idalia pulchella* (*Moll. Reg. Arct. Norveg.*, Tab. xiv.)

***Ancula cristata* (Alder.)**

Rare. Dublin Bay (Mr. Alder) : *Thompson* '44. One specimen 19 mm. long dredged in 2 f., Malahide, July, 1908 : *Colgan* '09. Two specimens, the longest 5 m.m. long, dredged in 14 f. off Skerries, July, 1913, one with a monstrous forked rhinophore ; one specimen in 10 f. off Bullock, August, 1913 : *N.C.* Also dredged in Lambay Deep off the Dublin coast, but outside of the county marine limits, in 39 f. : *Farran* '09.

***Triopa claviger* (Müller).**

Rare. A single specimen 11 mm. in length dredged in 2 f. in the channel between Colt Island and Church Island, Skerries, July 18th, 1913 : *Colgan* '13A.

The radula was made up of about 45 rows with 9 lateral plates in each half row ; and the auditory capsules contained 25 ovate otoliths.

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NOTICE.

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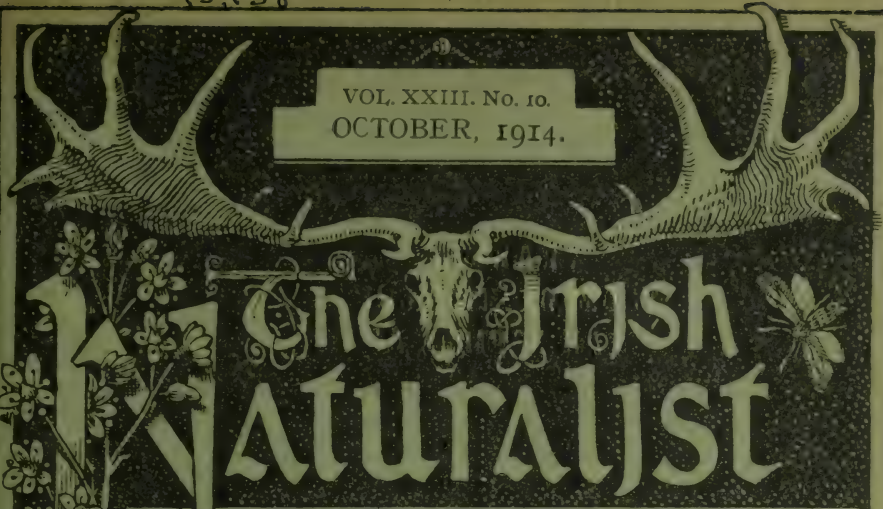
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EDITED BY


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A NOTE ON THE ANATOMY OF THE IRISH VITRINA DESCRIBED AS *V. PYRENAICA* OR *V. HIBERNICA*.

BY A. E. BOYCOTT.

PLATE I.

Two different accounts have been given of the morphology of the proximal parts of the generative apparatus of the new Irish *Vitrina* discovered by Mr. P. H. Grierson¹ in Co. Louth, which was originally identified by J. W. Taylor² as *V. elongata* (Drap.), subsequently by E. W. Bowell³ as *V. pyrenaica* (Fér.), and finally redescribed by J. W. Taylor⁴ in conjunction with Simroth as a new species under the name of *V. hibernica*.

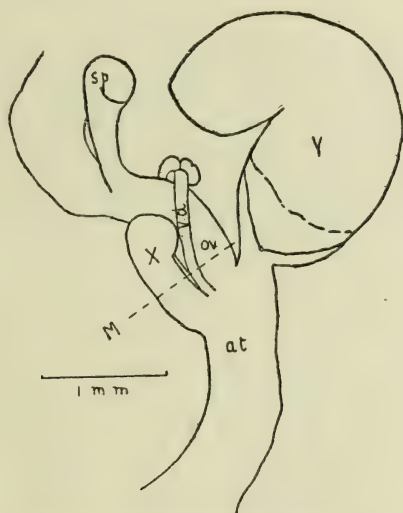


Fig. 1.—Proximal parts of the generative apparatus.

In figure 1 is represented what may be readily seen on gross dissection of the species in question. Into the end of the atrium (at.) or vestibule are inserted four obvious organs. The oviduct (ov.) after receiving the duct of the spermatheca (sp.) is clearly seen opening into the atrium :

¹ *Journ. Conch.*, xi. (1904), p. 125.

² *Irish Nat.*, xvi. (1907), p. 225.

³ *Irish Nat.*, xvii. (1908), p. 94.

⁴ *Monogr. Brit. Land and Fresh-water Moll.*, iii. (1914), p. 449.

the vas deferens (v.d.) convoluted above, runs downwards¹ along with it, and appears to terminate at or near the junction of the organ X with the atrium: on the opposite

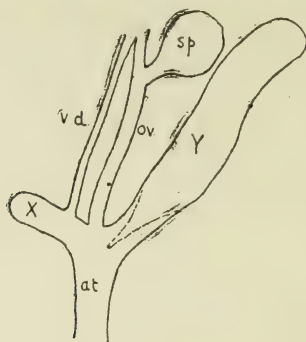


Fig. 2.—The organs of *V. hibernica*, after Taylor and Simroth.

side of the atrium opens the organ Y. According to Simroth-Taylor, an outline of the relevant parts of whose figure is shown in figure 2, the vas deferens (v.d.) does in fact end at its junction with X into which it opens "about midway": X is identified as the penis, and Y as a "dart gland." According to Bowell (see figure 3) the organ

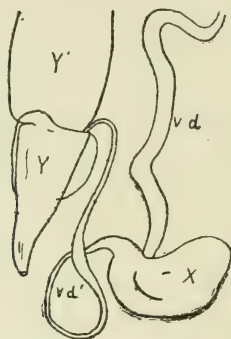


Fig. 3.—The organs of *V. pyrenaica*, after Bowell.

X is a dilatation of the vas deferens (v.d.) in the form of a sigmoid flexure; its cavity does not open into the atrium but is continuous with a lower section of the vas deferens

¹ i.e. towards the genital orifice.

(v.d. ') which crosses to the other side of the atrium, and opens into organ Y, which is to be regarded as the penis (Y) surmounted by a flagellum (Y').

These two accounts are hardly compatible with one another, and the points at issue appeared to be worth further investigation. This I have been able to undertake through the great kindness of Mr. P. H. Grierson, who made a special expedition to Collon on my behalf, and of Mr. A. W. Stelfox, who placed at my disposal a number of specimens preserved in alcohol.

At first sight it was difficult to understand how two such different anatomical descriptions could have been derived from the dissection of the same species, and it seemed probable that the material dealt with by Bowell must have been essentially dissimilar to that examined by Simroth. Actual dissection, however, soon showed the origin of both descriptions. I was unable, with needles and a dissecting lens, to definitely trace the vas deferens beyond the neighbourhood of the angle between the proximal ends of the free oviduct and X, and on the surface no continuation of the vas deferens towards Y could be found. Thus far the appearances were those described by Simroth-Taylor. On opening up the upper end of the atrium however, a stout white band was seen running from near the apparent termination of the vas deferens towards Y along the inner wall of, and projecting into, the atrium. This band was thickest at its origin, and tapered off gradually as it approached Y, and I was indeed unable to satisfy myself that it made a definite connection with Y. The appearances, however, were certainly not incompatible with Bowell's description.

Any fuller interpretation being beyond the range of gross dissection, a complete series of microscopical sections was cut in paraffin from the lower part of the atrium to a point well above the tip of Y and the spermatheca. A study of these sections has I think shown what the facts really are: they are represented in a highly diagrammatic form in figure 4. The vas deferens passes downward to the base of X, where it becomes deeply imbedded in the wall of

that organ : it here, without making any connection with the lumen of the atrium, turns sharply round and, still hidden in the wall, runs right up to the apex of X. Here it again turns and opens into the lumen of X. Following down this latter, it is clear that the lumen of X opens freely into the lumen of the atrium. The band, which was interpreted by Howell as a continuation of the vas deferens to Y appears in the sections as a thickening of the wall of the atrium ; it has no lumen, and forms no definite connection with Y. A transverse section through the organs approximately along the line M in figure 1 is shown in Plate I. The free oviduct (ov.) and the descending free part of the vas deferens (v.d.d.) appear as separate

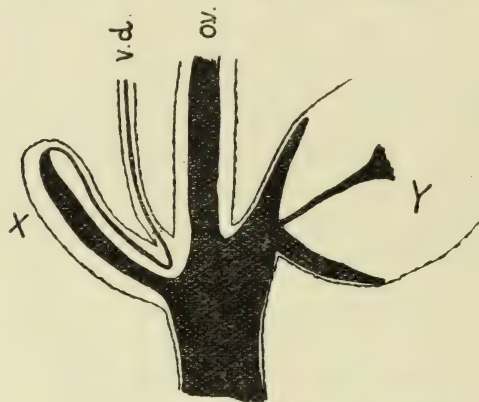


Fig. 4.—Diagram of the course of the vas deferens.

organs : in the organ X there are two lumina lined with epithelium, one (pen.) the main cavity, continuous below with the cavity of the atrium, the other (v.d.a.) much smaller, is the ascending part of the vas deferens which connects v.d.d. to pen.

My results therefore agree with those of Simroth-Taylor in so far that I regard X, and not Y, as the penis ; but the vas deferens opens into the extreme apex of this penis and not laterally. In this way the arrangement in the Irish species becomes more like that found in *V. pellucida*, in which the vas deferens is closely bound down to the penis though not actually incorporated in its wall. The organs

of a specimen of *pellucida* from Marple are sketched in figure 5, the vas deferens having been separated from the penis. I see no reason to doubt that the organ A is the penis: it certainly receives the vas deferens at its upper end, and opens into the atrium below. In correspondence with his interpretation of the Irish *Vitrina*, *Bowell* regards A as a dilatation of the vas deferens, and an organ similar to Y as the real penis. This latter I have not seen in *pellucida*: *Bowell* points out that it is often atrophic and difficult to find.

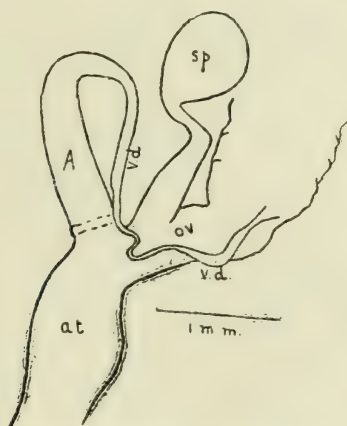


Fig. 5.—Organs of *V. pellucida*.

The sections also show that the duct of the spermatheca (sp.) is short, and opens high up in the free oviduct, thus differing rather markedly from *pellucida*.

On the nature of the organ Y it seems useless to speculate: it is certainly rash to call it a "dart gland" without further evidence that it corresponds either functionally or morphologically with the well-known helicid organ. In its upper part it has glandular walls and a capacious lumen, containing some quantity of semi-amorphous debris: glandular tissue of similar appearance is found in the penis. Its lower end is thick-walled and highly muscular, with quite a small opening at the tip of the papilla.

VITRINA PYRENAICA.

A SUPPLEMENTARY NOTE.

BY E. W. BOWELL,

IN May, 1908, my account of the anatomy of *Vitrina pyrenaica* was published in the *Irish Naturalist*. Recently I have been enabled to review the subject, with the kind assistance of Dr. A. E. Boycott. Briefly, I find that I was in error with regard to the two organs opening upon the atrium: the large object which I described as penis and flagellum is undoubtedly the homologue of the dart sac found in Helicids, and the object I have marked *d.v.d.*¹ (*i.e.*, diverticulum vasis deferentis) is undoubtedly the penis, as other authors have described it.² The coiled object joining the bases of these two organs, which I believed I had proved to be tubular and lined with epithelium, is in reality a portion of the fascia lining the cavity. I greatly regret that these errors of interpretation have been perpetuated. The plate (Plate 4, vol. xvii.) represents the actual appearance of the organs in question, each item having been drawn by means of the Abbe camera. Figure H represents the dart sac and penis, both separated from the atrium, and the coil joining them is merely fascia. The other figures may be taken as they stand, changing the names of the two organs which I erroneously identified. (I may add that in the first place I drew and described them under the usual names).

The following may serve to elucidate the lettering, which I am told has caused some trouble to readers:—

Fig. B, *r.p.* means reflected peristome.

Fig. D, *b.* means balancier; *g.o.* genital orifice.

Fig. E, *r.* radula.

r.s. radular sac.

r.i. reflected integument (twice).

g.o. genital orifice.

¹ In *Irish Nat.*, vol. xvii., pl. 4, fig. H.

² See the paper by Dr. Boycott, *supra*, pp. 205-9.

e. eye.

r.m. retractor (penis) muscle.

d.v.d. (really the) penis. (See above).

atr. atrium.

v.d. vas deferens.

oe. oesophagus.

s.g. salivary glands.

p.g., *p.g.* pedal ganglia.

sth. spermatheca.

s.d. spermathecal duct.

(*d.v.d.* just below this should be deleted).

p. and *fl.* are placed on the proximal and distal parts of the dart sac organ.

p.g. (below this) pedal groove.

v.d. (under the spermatheca), vas deferens.

f.e. "female epididymis."

m.e. male epididymis.

In Fig. F, besides those already explained :—

a.gl. albuminiparous gland.

h.d. hermaphrodite duct.

In Fig. G, *o.t.* ovotestis.

The large cells in this dart sac organ are very much like those met with in flagellar dilatations, but I was too hasty in presuming that they afforded a kind of histological test. That was in fact the beginning of my error. Dr. Boycott has kindly permitted me to see his paper (now published) in MS., and I agree entirely with his conclusions.

South Norwood, London, S.E.

REVIEW.

THE DUBLIN DISTRICT.

Geological Survey of Ireland.—Sheet 11. Map to scale of 4 miles to one inch, reduced from the One-Inch Maps of the Geological Survey, 1910, under the supervision of W. B. WRIGHT, B.A. Ordnance Survey Office, Southampton, 1913. Price 2s. 6d. net.

This clearly printed map showing the country from Baldoyle to Leighlin, and from the coast to Portarlinton and Castlecomer, will prove a great boon to geological students. It is a reproduction with a few necessary corrections from the former work of the Geological Survey of the district.

ARE GANNETS DESTRUCTIVE BIRDS?

BY J. H. GURNEY, F.Z.S.

IN his valuable and important remarks on the Gannet (*Sula bassana*) Mr. R. M. Barrington, reviewing my lately published monograph on this species,¹ alludes to the supply of fish required for human food not being diminished by what Gannets eat. I am glad that he considers that this point has been rightly insisted upon, in the work just mentioned, and that he takes the view he does about it, which is undoubtedly sound, if the whole subject be considered in its broadest sense. As the alleged destructiveness of Gannets is a matter about which very strong and very different views have been held, anything bearing upon the question is important, in support of the contention that there are fish enough in the sea for man and the birds too. All scientific enquiry, undertaken by Professor Huxley and others subsequently, indicates that however many fish Gannets and Cormorants may eat, the extraordinary fecundity of fish will speedily make good the loss. The fish about which we are principally concerned is the Herring, which, in our seas, is the chief food-fish of the Gannet, whether on the coast of Ireland or of Great Britain, in both of which countries the Herring industry is very large. Indeed few people who have not gone into the actual figures, have any conception of the extent to which this trade has now reached, or of the magnitude of the capital embarked in it by fish merchants. Let me quote from the authorized fishery returns. During the year 1912 the Fishery Board of Scotland returned the total catch of Herrings, brought into Scottish ports, at 5,201,300 cwts., and during the season following (1913) at 4,449,323 cwts.² This latter being somewhat the lowest record for eleven years. Taking the first of these

¹ "The Gannet, A Bird with a History." London (Witherby & Co.) See *supra*, pp. 156-8.

² "Scottish Fisheries. Thirty-second Annual Report," V.

two returns as nearly an average year, and allowing 250 Herrings to the hundred-weight (which I am told is about right) we have a gross total of over thirteen hundred million (actually 1,300,325,000) Herrings taken in twelve months, not necessarily in Scottish waters, but all brought into Scottish ports.

Be it remembered that this takes no account of the English and Irish fisheries, which are very extensive also. There is no port in the world into which so many Herrings are brought as Great Yarmouth, in Norfolk; and Lowestoft is not far behind. In 1912 the Herrings landed at these two ports together numbered 1,361,000,000, and in 1913 1,362,000,000, and many come to Grimsby also. In 1913 the return for Grimsby was 75,487,000. Probably the number brought into all ports in the British Isles was close on three thousand million Herrings, in twelve months—a number too great to grasp!

Surely these prodigious numbers, which are really almost beyond human realization, are enough to convince the enemies of the Gannet that at present the supply of sea-fish remains inexhaustible, and that there are Herrings enough in the sea for everybody and everything.

The more they are caught, the more do the remainder which escape the nets, multiply, especially the Herring. The truth is that but for Gannets, Cormorants, Gulls, Guillemots, Puffins, and Divers there would soon be a surfeit of fish. The part played by these sea-birds is just as important in the economy of nature's kingdom, as is that which birds-of-prey play in keeping down rats and mice, or small birds in suppressing the generation of myriads of insects. That Gannets and Cormorants may do some harm locally, that is to shore fishermen who never go far out, where they are numerous, is quite possible. None will deny that that may be the case, but that their depredations have the slightest effect on the stock of Herrings and Mackerel as a whole, is hard to believe, with such figures before us as those here quoted.

SOME NEW OBSERVATIONS ON THE LIFE-HISTORY
OF WARBLE-FLIES.

THE ENTRANCE OF THE MAGGOT INTO THE HOST'S BODY.

BY PROF. GEORGE H. CARPENTER, M.SC., AND
THOMAS R. HEWITT, A.R.C.SC.I.

The life-history of the Ox Warble-flies (*Hypoderma bovis* and *H. lineatum*) has been for many years a subject for enquiry by naturalists and veterinary surgeons as well as by farmers. Those interested in the progress of research into the question will find the main results obtained up to the end of last century well set forth in an article by Imms.¹ It was then established that the eggs are laid attached to the hairs of the cattle, that the second-stage maggots may be found abundantly in the sub-mucous coat of the gullets of oxen and heifers from August onwards, and subsequently wandering through various tissues in the dorsal and lumbar regions, and that in this second stage they arrive beneath the skin of the back, where in late winter and spring the third-and fourth-stage larvae are familiar objects, inhabiting the swellings or "warbles," each pierced by a central breathing-hole through which the "ripe" maggot works its way for pupation on the ground. So far, however, the first-stage maggot was known only from Riley's figure² of an unhatched specimen, and no certain knowledge had been obtained as to its mode of entry into the host animal's body. Formerly it was generally believed that the female fly lays her eggs on the back, and that the maggots bore their way in directly through the skin. But the observations of Curtice and Riley that in North America the female *H. lineatum* lays her eggs mostly on the heels and that second-stage maggots appear commonly in the gullet, have led in recent years to a general belief (at least among entomologists) that the eggs—or, as

¹ *Journ. Econ. Biol.*, vol. i., 1906, pp. 74-91² *Insect Life*, vol. iv., 1892, pp. 302-17.

in the case of Horse Bot-fly (*Gastrophilus equi*), the newly-hatched maggots—must be licked in by the cattle, bore through the mucous coat of the gullet, and, after resting awhile in its sub-mucous coat, work their way to the final position beneath the skin of the back.

In order to ascertain if possible the exact method of the young maggot's entrance, experiments and observations have been carried on for the past ten years, mostly at the Agricultural Station, Ballyhaise, Co. Cavan, under the auspices of the Department of Agriculture and Technical Instruction. Three reports on the work done have already been published,¹ and a fourth is now in course of preparation. The experiments from which the most important results were expected consisted in keeping a number of calves through the summer in the field by day, muzzled in such a manner that it seemed impossible for them to lick themselves, and tied up by night with their necks in "bales" and with broad aprons so that they could not touch their fore-limbs with their tongues. Along with these animals a number of others were allowed to graze naturally. It was considered that if the warble-maggots enter by the mouth, calves muzzled in this way ought to be protected, and to show no warbles in the succeeding year.

A summary of the results of these muzzling experiments may be instructive. In the summer of 1906 six calves were muzzled and six unmuzzled grazed in the same field. In the spring of 1907 the former had on an average 15·3 warbles each, the latter 10·8; the muzzled calves were thus apparently unprotected, and the result was considered to "afford strong support to the old view of the method of entrance directly through the skin." In 1907 the experiment was repeated, with a very different result. Of the calves subjected to the muzzling test only two survived till the next spring, when these were found to be entirely free from warbles, while the twenty-nine unmuzzled animals, on the other hand, had an average of 7·7 warbles each. This might

¹ *Journ. Dept. Agric. Tech. Instr. Ireland*, vol. viii., 1908, pp. 227-246; vol. ix., 1909, pp. 465-476; vol. x. 1910, pp. 642-650.

be taken to support the view that the maggot enters the host-animal by the mouth, though the fact that the experiment was carried through on two animals only makes any conclusion on the subject very doubtful. In 1908 the same course was pursued, and it was found that in the spring of 1909 the six beasts which had been muzzled showed, on an average, 9·16 warbles each, and the thirty "controls" 12 each. Here, therefore, with a fair number of experimental calves, the result resembled that of 1906-7, and once again supported the theory of entrance by the maggot through the skin.

During the summer of 1909 the experiment was repeated with the additional precaution of a strong wire cage surrounding each leathern muzzle, so that the leather could not touch any part of the animal's body, and the bare possibility of eggs or maggots being sucked in through the breathing-holes was obviated. Five calves were thus muzzled, and fifteen were left untreated; in the spring of 1910 the former had an average of 2 warbles per head, the latter of 6·3, and it was found that all the maggots from the animals that had been muzzled were extracted in April, none being visible at the second count of warbles in May. In the summer of 1911 the same arrangement was tried again, ten calves being muzzled and seventeen left to graze normally, the average for the former lot was 8·4, for the latter, 12·9, and again it was found that all the maggots in the beasts that had been muzzled "ripened" early; none were extracted at the second count. These results suggested that muzzling might give at least partial protection.

In all the summers thus far mentioned the muzzled calves and their "control" companions were allowed to wander at will all over a certain field. It was noticed that the muzzled calves—probably on account of not being able to graze—were often assembled at the edge of the pasture, where they were sheltered by hedges or trees, while the "control" animals were wandering in the middle of the field; as the warble-flies are on the wing only in bright sunshine, the latter were, in such conditions, clearly more open to attack than the muzzled beasts. When the experiment

was started again last year (1913), therefore, it was arranged to confine all the calves to open ground by means of wooden hurdles, so that the muzzled ones should not have the indirect protection of shelter. The result in the spring of this year was an average of 21 warbles each for ten muzzled cattle and 15 each for eleven unmuzzled. Instead of two counts only as in previous years, five separate extractions of maggots were made at various dates from March 27th to June 3rd. At the first two dates the unmuzzled animals were quite free from warbles; at the last count five of the muzzled ones were free and two others had but a single maggot each. The result of these later experiments tends to show, therefore, that muzzling confers no protection when the general conditions are similar for both muzzled and "control" animals. We cannot yet see why the muzzled beasts should be—as they apparently are—attacked earlier in the season than the "controls;" but it seems clear that the freedom of the muzzled animals from warbles at the late counts in 1910 and 1912 may be explained by an increasing tendency on their part to seek the shade as the summer advanced and the weather became hotter. The larger proportion of warbles in the unmuzzled animals in the especially carefully conducted experiment of 1913-14 suggests not only that the maggots enter the cattle by boring through the skin, and that the normal mode of entrance cannot be by the mouth, but that the beast's tongue, instead of aiding the maggot in its career, is an important factor in reducing the numbers of the parasite. Cattle may be observed to lick the place where eggs have been laid, and many of the eggs are probably thus knocked off and killed.

During the last two seasons we have done our best to supplement the results of the muzzling experiments by direct observation on the mode of egg-laying and hatching of the young maggot. The result of our work in this direction during 1913 has been (by permission of the Department) published in a recent paper¹ where we have given an account, with figures, of the newly hatched maggot of *Hypoderma bovis* (from eggs that had been kept for four days

¹ *Sci. Proc. R. Dublin Soc.*, vol. xiv., 1914, pp. 268-290, pls. xxi-xxvi.

in an incubator). The eggs are laid by the female *Hypoderma* on the legs, and more rarely on the flanks; we have never seen a fly strike at a beast's back—the region popularly supposed to be the place of egg-laying. The eggs of *Hypoderma bovis* are laid singly attached to a hair near its base; those of *H. lineatum* are laid in rows of seven or more on the hair about half-way up. This difference in the habit of the two species has been recently pointed out by Gläser,¹ and we can confirm his observations, made in Germany, on this point; also that the eggs are hatched while attached to the hairs, for empty shells, split at the distal end, where the larvae have emerged, have been several times seen by us.

Unfortunately the tiny maggots obtained in the summer of 1913 only survived for a few hours, and we had no opportunity of studying their behaviour. The newly-hatched maggot is less than 1 mm. in length, with sharp, powerful mouth-hooks and a strong, spiny armature on the body-segments. In the paper just mentioned we remarked that this well-armed though tiny larva "could, perhaps, bore as readily through the skin as through the mucous coat of the gullet, and we may eventually find the former to be the usual mode of entrance." During the summer of this year we have obtained positive evidence that the newly-hatched maggot does bore through the skin of cattle, and with the kind permission of the Department, we think it advisable to publish our observations on this fact of the life-history—as to which clear knowledge has for so long been wanting—without delay.

Besides the experiments at Ballyhaise, a number of observations on warble-flies and maggots have been carried on at the Athenry Agricultural Station by our colleague, Mr. James Duncan, B.Sc., who has received much valuable help from Mr. R. Y. Smith, the farm manager, and Mr. Lang, the cattle-herd. At Athenry *Hypoderma lineatum* appears to be the common species, whereas at Ballyhaise *H. bovis* is

¹ Mitt. des Ausschusses zur Bekämpfung des Dasselplage, Berlin. No. 3
4, 5, 1912-13.

the more abundant ; and it is well known that the latter species appears later in the summer than the former. In the first week of June Mr. Duncan told us that eggs of *H. lineatum* were plentiful on cows at Athenry, on the hairs of the thighs not far below the root of the tail, and that a few days after the eggs had been laid Messrs. Smith and Lang observed a soreness in the neighbouring region of the skin with a discharge of matter. One of us (G. H. C.) accordingly went to Athenry accompanied by Mr. T. K. Reddin, M.R.C.V.S., who is associated with us in this enquiry. The region of the body where these eggs were laid was very convenient for examination, and the milch cows, standing quietly in the byre, were much better subjects for observation than restless calves in the field. We found that the cow's skin near the newly-hatched eggs was perforated by minute holes from which flowed a watery discharge which hardened on the surface to a scaly deposit, and that after a day or two the region affected became covered with small pimples ; these disappeared a few days later. On squeezing the skin of the earliest " case " that could be obtained, some clear, watery fluid exuded, and a smear of this examined microscopically was found to contain a newly-hatched maggot of *Hypoderma lineatum*.

This satisfactory observation incited to further work at the problem later in the summer with *H. bovis* at Ballyhaise, where one of us (T. R. H.) has been in charge of the experiments during the past two seasons. In July twenty-four maggots were hatched in the incubator, and some of these were used for observations as to behaviour when placed on a calf's body. Gläser, in 1913, had tried to carry out observations of this kind, by placing maggots on a shaved portion of a calf's skin ; he found that they made no effort to bore through. Instead of being shaved, a small patch on the shoulder of one of the Ballyhaise calves was clipped, so as to have the conditions as normal as possible, and newly-hatched maggots of *H. bovis* were placed on it. Immediately they started crawling down the clipped hairs to the skin, and, as soon as they reached the surface, they began to burrow. On account of their small size it is hard to discern them, but by

careful watching through a lens it was seen that they enter perpendicularly to the surface, evidently cutting into the epidermis with their mouth-hooks and occasionally bending their bodies. Mr. R. G. Whelan, A.R.C.Sc.I., Superintendent of the Ballyhaise Agricultural Station, kindly helped in the observations and confirmed them. Six hours after having been placed on the calf, the maggots disappeared completely. Next morning the spots where they had entered were marked with little pimples, like those on the Athenry animals, easily to be seen with the naked eye. These increased slightly in size, but soon healed up, and in less than a week not a trace of the maggots' entrance could be found. The boring-in of the maggots seemed at first to cause the calf a little pain, but the symptoms of discomfort soon passed away.

We believe, therefore, that no further doubt is possible as to the entrance of the young *Hypoderma* larva into its host through the skin close to wherever the eggs may have been laid, and the results of the muzzling experiments show that effective entrance by the mouth is unlikely. The question arises whether these observations of ours lend support to the view put forward by some Continental students that the second-stage larvae found in the gullet have entered by the mouth, but can never make their way to the back, and perish before attaining their full size. On the whole, the period (October-March) during which these larvae are found in the gullet suggests that this organ is truly a resting-place for them in their wanderings through the tissues—wanderings that are well known to be widespread. We have still to find out what happens to the first-stage larva after it has bored into the skin and how far it travels before it undergoes its first moult. Gläser found that some eggs of *Hypoderma lineatum* laid on his trousers hatched, and that a maggot bored right through into his own skin. From symptoms of swelling and pain in various regions he concluded that this maggot travelled to his gullet, and he finally extracted it (in the second stage) from his mouth! Dissections of slaughtered heifers from Athenry have shown that the entrance-holes made by the

maggots penetrate through the epidermis, but they can only be traced to the superficial layers of the dermis. So far our colleague Mr. Reddin has not found the first-stage maggot anywhere inside the bodies of cattle, and on account of the minute size of this larva its discovery there will prove a difficult task. This problem it is hoped may be cleared up by future work; for the present, by certifying the direct boring of the young maggots into the skin, we are glad to have made some contribution towards settling a long-disputed point in the life-history of the Warble-flies.

Royal College of Science, Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include three Chimpanzees, one on deposit and a pair by exchange; a Green Monkey from Mrs. Lofmark, a Macacque Monkey from Mrs. Stenson, three Capuchin Monkeys, a Marmoset and a Hutia from Dr. E. Bate, a pair of Tiger cubs from Col. Combe, a Badger from Mr. H. G. Constable, a Brown Bear from Capt. Howard Bury, a pair of Tawny Owls from Mr. W. J. Williams, two Silver Pheasants from Mrs. Low, a pair of Sand Grouse from Mr. H. B. Rathborne, a pair of Wild Ducks from Mr. Butler, Kestrels from Mrs. Ellis and Miss Brandon, Sparrow Hawks from Miss Leggatt and Messrs. J. C. MacLean and H. W. Shanahan, a Viper and a Slowworm from Mr. Head, a Tortoise from Mr. E. N. Green, and a number of Carp from Mr. A. E. Goodbody. A pair of White-fronted Geese, a Bar-headed Goose, a White Swan, a pair of Black Swans, and a Brazilian Hangnest have been acquired by purchase or exchange.

The acquisition of the three new Chimpanzees brings the stock of these apes up to five, the largest number ever on view at one time in Dublin. The male lately arrived is older and larger than any former inmate of the ape house, except the recently deceased "Tom." He differs considerably in colour and expression from the other Chimpanzee, being dark-skinned and broad-faced; probably he will prove to belong to the rare "Bald" species or Koola-Kamba (*Anthropopithecus calvus*). The Hutia given by Dr. E. Bate is a West Indian rodent allied to the well-known South American Coypu; but while the latter is aquatic, the Hutia is a tree-climber. These arrivals are very rarely seen in zoological gardens, and none has ever before been shown in Dublin.

BELFAST NATURALISTS' FIELD CLUB.

MAY 30.—THE HARE'S GAP.—The second excursion of the season took place, when over forty members and their friends went to Newcastle by the 9.35 a.m. train. Robert Bell and Joseph Maxwell were the conductors on this occasion. On arrival the party proceeded by brakes to the mouth of the Trassey Valley *en route* for the Diamond Rocks. The brakes were left behind above the Trassey Bridge, and the remainder of the excursion was continued on foot. In about half an hour the Hare's Gap, the narrow col joining Slieve Bearnagh and Slieve-na-Glogh, was the most prominent feature in the landscape. After lunch the journey was continued right over the Gap and round the southern slope of Slieve-na-Glogh. Then a further ascent of about 300 feet brought the party to the Diamond Rocks. With the help of some quarrymen, and a geologist working a 10 lb. sledge, they began at once looking for the minerals which are the special characteristic of the granite in this locality. Many specimens were found, and the members were able to bring home more or less excellent examples of beryl, topaz, clear, smoky, and black quartz, mica, and also the commoner minerals.

During the afternoon Dr. Derryhouse, of Queen's University, gave a short address, in which he dealt with the geological features of the Mourne Mountains. The party highly enjoyed the *al fresco* lecture.

The view of the mountains at this point was charming. Looking south, over the head of the Silent Valley rose the fine crest of Slieve Bingian, the greatest mass of any single mountain in the whole range. To the left rose the broad shoulders of Slieve Commedagh, backed by the towering form of Slieve Donard, the monarch of the range. On the right, the tors crowning the summit of Slieve Bearnagh completed the panorama.

On the way back to the cars attention was drawn to the weathered slopes of Slieve Bearnagh, where the granite appeared like walls of gigantic masonry. While, of course, the chief interest of the day was geological, the botanists of the party made some collections of plants, including the following :—*Listera cordata*, *Juniperus nana*, *Hymenophyllum Wilsoni*, *Saxifraga stellaris*, *Ulex Gallii*, *Lycopodium Selago*. At the subsequent business meeting at the Slieve Donard Hotel several new members were elected including Mr. J. W. Manning, formerly of Rosapenna, but now manager of the Slieve Donard Hotel.

JUNE 13.—CASTLE ROBIN.—A party of over fifty members and friends left the Great Northern Station at 2.30 p.m. for Derriaghy Halt, whence they proceeded on foot to their destination—Castle Robin—a distance of about three miles.

A short description and history of the place was given by Robert May, who mentioned that the ruins still remaining were those of a castle erected some hundreds of years ago by one Roger Norton, an officer in Essex's army. The prehistoric mound or tumulus close by the ruins of the castle, and upon which the party was standing, was known as "Lis-na-Robin" long prior to Norton's day, and it doubtless gave its name to the castle.

Leaving what remains of the castle behind, the members, under the leadership of Robert Bell, proceeded to the neighbouring quarries. The quarries are in the Lower Basalt, and an intrusive dyke of amygdaloidal

basalt was examined. Amongst the mineral constituents pointed out were analcite, natrolite, and chabazite, with crystals of calcite in cavities or pockets in the rock.

Leaving the higher ground, the party then proceeded to Lisburn, where, after tea, a brief business meeting was held. Nevin H. Foster, M.R.I.A., in the chair. Five new members were proposed and duly elected.

DUBLIN MICROSCOPICAL CLUB.

MAY 13.—The Club met at Leinster House, D. M'ARDLE (Vice-President) in the chair.

Dr. G. H. PETHYBRIDGE showed seedlings of celery plants having the pycnidia of the parasitic fungus *Septoria petroselini* var. *apii* on their cotyledons. These seedlings were raised from celery "seeds" having pycnidia on their surfaces containing viable spores, and the assumption hitherto made that the leaf-spot disease of celery can be transmitted by sowing affected seed has now been proved to be well founded.

Prof. G. H. CARPENTER showed the maxilla of a new species of *Machilid* from the Seychelles, demonstrating the extreme complexity and beauty of the "brush" carried on the "head" of the inner lobe or lacinia; the "brush" in this insect consists of more than fifty flexible spines, each slightly enlarged towards the tip, and then tapering to a delicate point.

D. M'ARDLE exhibited the peristome of *Ceratodon purpureus* a moss which is conspicuous at this time of the year in exposed places on the Hill of Howth, where the material was recently collected; it grows in large patches, yards in extent, and is attractive from a distance on account of the numerous bright red coloured seta or fruit stalks. It is evenly distributed in Ireland on wall-tops and barren ground. One slide showed a portion of the teeth, of which there are sixteen, deeply divided and composed of two differently coloured laminae, the outer one bright red, more solid and narrower than the inner one, which is yellow. The outer one is crossed by transverse ridges which are continuous at the base of the peristome, forming a broad ridge; towards the apex they become more distant; when mature the teeth become covered with minute spicules and the inner lamina shrivels up. A second slide showed the large annulus which is deciduous and has a double row of obovate cellules, sixteen cells in circumference and three or four cells thick. Both parts of the peristome are noted by authors as beautiful microscopical objects. The name *Ceratodon* is derived from the horn-like teeth which have been aptly compared to the horns of a goat.

DUBLIN NATURALISTS' FIELD CLUB.

APRIL 25.—EXCURSION TO THE BOTANIC GARDENS, Glasnevin.—About thirty members and friends took part in this excursion, the special object of which was to study the Alpine plants. Sir F. W. Moore acted as conductor, and earned the hearty thanks of the party by the care with which he explained the minutest points of interest, both at the Rock Garden and in the nurseries.

MAY 23.—EXCURSION TO MALAHIDE.—Favoured by fine weather, a party of about twenty members and visitors left Amiens Street by the 1.45 train, reaching Malahide at 2.5. They were then guided by their conductor, J. de W. Hinch, along the sea-shore towards Robb's Walls, where the rocks and stones below high water mark were found to be rich in corals of the Lower Carboniferous; while the living animals, eggs, and shells were demonstrated by Miss Massy, and the sea-weeds by Miss Knowles. The tide being low, some successful collecting was made of the eggs of marine animals, notably of *Natica cutena*, which the President was desirous of rearing. Two pairs of the Tree Sparrow were recognised by A. Williams. The interest being so varied, the party regretted the shortness of the time available, returning in time to have tea in Malahide before catching the 5.40 train home.

JUNE 20.—EXCURSION TO JOBSTOWN AND SEECAUN.—On account of the unsettled weather only six members assembled at Terenure to take part in this interesting walk; but despite a few rather heavy showers the day proved enjoyable and profitable. After driving to Jobstown the party walked over the high hill road to Ballinascorney Gap, where in a small bog W. B. Bruce pointed out *Orchis incarnata*, new to District 7 of Colgan's "Flora of Co. Dublin." Thence the party ascended Seecaun (2,161 feet) whence an extensive view was obtained. A number of stone rings and Bronze Age burial cysts were noted on the summit, where a brief collecting time among the invertebrates yielded *Lithobius variegatus* and *Acantholophus morio*. Descending by the ridge to Bohernabreena, a flock of Swifts was noticed flying at a good elevation. An ornithologist of the party stated that these birds habitually scour the hills by day, returning to the city in the evening. *Listera cordata* was seen in flower, and some early spring-blooming plants, such as *Draba verna* and *Ranunculus Lenormandi*, were observed to be still in bloom on the high ground. At Bohernabreena tea was provided by Mrs. Hely, after which the walk was continued along the Dodder bank to Tallaght where the steam tram was taken for home.

CORK NATURALISTS' FIELD CLUB.

MAY 4.—ANNUAL GENERAL MEETING.—Thos. Farrington, M.A., presided. The Hon. Secretary, J. Noonan, and Hon. Treasurer, W. B. Lacy, submitted their reports, which were adopted. The election of officers and committee for next session resulted as follows:—President, Prof. I. Swain; Vice-Presidents, Prof. M. Hartog, T. Farrington, Wm. H. Johnson, R. A. Phillips, H. Lund; Hon. Secretary, J. Noonan; Hon. Treasurer, W. B. Lacy. Committee:—Miss Blanche E. Duke, B.Sc., Miss M. Dobbin, B.Sc., Miss M. E. Bergin, M. Holland, R. Blair.

MAY 13.—EXCURSION TO BLARNEY.—A party of twenty-four travelled from Muskerry Station, M. Holland acting as conductor. Blarney Castle was visited and its history related. By permission of Sir George Colthurst the "Rock Close" (said to have been a famous place of Druidical worship) was visited. It contains a fine collection of yew trees. A visit was also paid to the lake, which was at one time a well-known source of supply of the Medicinal Leech (*Hirudo medicinalis*), which is not now known to exist in Ireland.

NOTES.

BOTANY.

Spiranthes Romanzoffiana in Co. Tyrone.

By the discovery, on a Belfast Field Club excursion, on July 25th, of *Spiranthes Romanzoffiana*, at Washing Bay, Co. Tyrone, this rare plant is now known to grow in all five counties which surround Lough Neagh, viz., Down, Antrim, Derry, Tyrone, and Armagh. It is here essentially a lakeside plant, the stations more than a mile from the lake shore being beside rivers which flow into or out of Lough Neagh. In the present instance the plant was first detected by Mr. N. H. Foster, and subsequently traced by the party for a distance of a mile, at least a hundred specimens being seen, occurring sometimes singly, sometimes in little colonies of up to a dozen. The habitat was the usual one—marshy meadows.

R. LL. PRAEGER.

Dublin.

Rumex maritimus in North Kerry.

While walking with a friend along the north side of Tralee Bay towards the close of last July, we came upon a fair quantity of this rare Dock growing in a small swamp near the sea; this swamp is probably a pool for the greater portion of the year. As at present known, *Rumex maritimus* appears to be confined in Ireland to a few of its southern counties. In addition to this North Kerry record, it is only known to occur in single stations in Counties Limerick, Cork, and Wexford. Mr. Colgan considers this Dock to be now extinct in Co. Dublin, while several other old records are regarded as doubtful.

REGINALD W. SCULLY.

Dundrum, Co. Dublin.

ZOOLOGY.

Notes on Some Irish Lepidoptera.

Vanessa urticae, L., has commenced to hibernate much sooner than usual. I noticed specimens coming into my house during the last fortnight in July, fully a month earlier than usual. Possibly this is a sort of aestivation, for I have observed *Pararge egeria*, L., coming in during the latter part of August; as the butterfly is on the wing till the middle of October in favourable seasons, it is remarkable to see it going into winter quarters so soon.

Acherontia atropos, L.—A specimen of this fine moth was sent to me by the Rev. J. Jennings, B.D., on June 24th. He tells me that it flew into his rectory some days before he sent it, and remained quiescent. It has

a curious penchant for entering houses and in many cases causes great consternation by its entry. I heard of one case where a whole household save one more courageous man fled before the advent of one of these moths. The aforesaid man not only faced the intruder, but captured it, put it in a paper bag, and sent it to me !

Chaerocampa porcellus, L., and *C. elpenor*, L.—Specimens of these handsome moths were sent to me in June by Mrs. Trinder. They had flown into the rectory at Rossnowlagh, Co. Donegal, and had been captured by her and very kindly sent to me. The former, according to Mr. Kane's Catalogue, seems to have been chiefly found in the more southern parts of the county. I took it here, but I do not know of any record of its occurrence in Donegal.

Macroglossa bombyliiformis, Esp.—I received an example of this moth from Wakefield Richardson, Esq., which he had taken at the Wood House, Bessbrook, Co. Armagh, on May 28th, 1914. He tells me that he has taken its congener, *M. fuciformis*, in Co. Louth, but as I have not seen the specimens I cannot vouch for the correctness of his determination, and as Mr. Kane says it has never been obtained in Ireland, caution is necessary.

Hyponomeuta padi, Zell. Sta.—I was sent a nest of the larvae of this moth by Miss Gertrude Alexander, which she had found at Newcastle, Co. Down, on a tree which, as well as I could make out, was some species of *Prunus*. The larvae duly spun up and moths began to emerge on July 12th. Along with them were a couple of species of *Ichneumon* flies, to which I hope to refer in a future communication. I have not met with this species before, though I have taken its congener, *H. cognagellus*, H., at Loughbrickland, Co. Down, and reared it from larvae found in Spindle-tree, near Tanderagee, Co. Armagh.

Plutella cruciferarum, Zell. Sta.—Larvae of this moth occurred rather too plentifully on cabbage in my fields this summer. The moths began to emerge on July 19th. The larvae lived in little webs, and eat holes in the cabbage leaves. Professor Carpenter, *Economic Proceedings R.D.S.*, 1901 and 1907, reports attacks on this moth on turnips, to which it occasions great damage.

W. F. JOHNSON.

Poyntzpass.

Mollusca on the Great Saltee Island.

On June 21st, in company with some friends, and in very dry weather, I spent a few hours on the Greater Saltee Island. The object of our visit was to see the seabirds which were breeding there in great numbers, so I had very little time to collect mollusca, and the following is a list of all I found :—*Limax maximus*, *Agriolimax agrestis*, *Vitrina pellucida*, *Hyalinia crystallina*, *Arion ater*, *Arion intermedius*, *Pyramidula rotundata*, *Helicella virgata*, *H. intersecta*, *Hygromia hispida*, *Helix aspersa*, *H. nemoralis*, *Cochlicopa lubrica*, *Pupa cylindracea*, *Limnaea pereger*, *L. truncatula*, *Planorbis spirorbis*, *Paludestrina Jenkinsi* and *Pisidium pusillum*. The freshwater species, including *Paludestrina Jenkinsi*, were all taken in the

outlet of a well near the house. All the shells are similar in form to those of the same species found on the adjacent mainland. Eleven of them are additions to the short list published by Mr. Praeger last year (*I.N.*, xxii., 218).

R. A. PHILLIPS.

Cork.

Long-finned Tunny on Shore of Achill Island, Co. Mayo.

A specimen of the Long-finned Tunny (*Thynnus germon*, Lacép.) was found on the shore at Dugort, Achill Island, last August, and kindly sent to the Dublin Museum by Mr. J. R. Sheridan. A slightly larger specimen, found on the coast of Wexford in the autumn of 1901, was described and figured by Dr. Scharff in the *Irish Naturalist* (vol. ix., p. 105). This would seem to be the only previous record of the occurrence of the Long-finned Tunny on the Irish coast. The Dugort specimen measures 2 feet from the tip of the snout to the fork of the tail, and the pectoral fin is 9 inches in length; the corresponding measurements in the Wexford specimen being 2 feet 7 inches and 11 inches respectively.

A. R. NICHOLS.

National Museum, Dublin.

Long-tailed Skua in Co. Donegal.

On 30th May last Mr. J. M. Harvey saw a Long-tailed Skua, *Stercorarius parasiticus*, L., at the island of Doagh, Innishowen. He had a very powerful glass, and was able to examine it minutely. From his description it was an adult bird.

D. C. CAMPBELL.

Londonderry.

Richardson's Skua in Co. Sligo.

Mr. D. P. Hope Johnstone, of Laragh, Maynooth, Co. Kildare, informs me that he observed a Richardson's Skua on Lough Arrow, on May 31st. On June 6th he also observed and photographed a Buffon's Skua, also on Lough Arrow. This bird was "remarkably tame, and after the photograph had been taken, and when all the films were used, it swam up within about six feet of the boat and took a May fly on the water." I have seen the photograph mentioned, and it is remarkably clear, though small.

HELEN M. METCALFE.

Enfield, Co. Kildare.

The Roseate Tern in Ireland.

In the current volume of the *Irish Naturalist*, p. 17, I recorded the discovery of a breeding colony of Roseate Terns, *Sterna Dougalli*, Mont., in Ireland last year. I regret to say that this year the birds did not return to

the locality to breed. On the 5th June last two pairs of Roseate Terns and an odd bird were seen, but they had disappeared by the time the next visit was made to the locality, *i.e.*, on 6th July.

GEO. R. HUMPHREYS.

Kylemore, Co. Galway.

Green Sandpiper in Co. Kildare.

On July 21st, whilst walking along the Blackwater river, near Metcalfe Park, Enfield, Co. Kildare, a bird rose almost at my feet from the edge of mud, along the water side, the river being very low. It flew away from me, down stream, and from what I saw of it I describe it as follows:—The upper parts bluish-grey, under parts white; rump and tail-coverts white, and very conspicuous in flight; tail short, and black and white; bill brownish and slightly curved, and rather long. Flight erratic, like that of a Woodcock, with slightly arched wings. Size of bird somewhat larger than a Snipe. I sent a description of the bird to Mr. E. Kay Robinson, F.Z.S., and he is of the opinion that it was a Green Sandpiper; this was also my own idea, strengthened after I had heard from him, and also looked up the Green Sandpiper in Professor Patten's *Aquatic Birds of Great Britain and Ireland*. I may mention that the above description and the account sent to Mr. Kay Robinson were both purposely given before I had referred to any book.

HELEN M. METCALFE.

Enfield, Co. Kildare.

Breeding of Canadian Geese at Dunmurry, Co. Antrim.

It may interest the readers of the *Irish Naturalist* to know that almost every year a clutch, and sometimes two clutches, of Canadian Geese (*Bernicla canadensis*) are reared on the lake at Ballydrain, Dunmurry, Co. Antrim. The birds are now (whatever they may have been originally) in a perfectly wild state, very wary, and difficult to observe. This year there were twelve birds in all, and as they always divided and went about in two parties of six each, I presume they were two clutches. These geese do not come to the lake every year, and in 1911 and 1913, when I was at Ballydrain, they were not there. They usually come every second year or so, and Miss Montgomery informs me that they arrive in the spring and remain to breed, leaving again some time in August. This year I saw them every day from July 31st to August 6th; after that date they disappeared, and so far as I know have not returned since. If Canadian Geese were originally introduced on this lake, it must have been a very long time ago, as the birds which have bred there for a considerable number of years do so in an entirely wild state. It would be interesting to know if these geese breed elsewhere in Ireland as they do at Ballydrain.

HELEN M. METCALFE,

Enfield, Co. Kildare.

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CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the EDITORS, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Contributors are earnestly requested not to write their communications on Postcards.

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EDITED BY

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AND

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SAXIFRAGA HIRCULUS IN ANTRIM.

BY A. W. STELFOX AND S. WEAR.

On 6th July last we visited Mr. Praeger's station on the plateau above Glenariff, Co. Antrim, for this rare plant which, though searched for several times, has not been seen here by local botanists since 1886. The habitat lies at an altitude of about 1,100 feet, between Crocknavar and Big Trosk, a little to the west of the Inver River. Here Mr. Praeger found the plant in July, 1885, and again visited the place in July, 1886. Upon the occasion of our visit it was not yet in flower, but thanks to Mr. Praeger's directions we had no difficulty in finding the plant. The habitat is an almost flat spongy bog of about twenty yards in diameter, surrounded by wide, undulating moorland, in which *Calluna* is dominant. The spot has the appearance of having been a small pool, but is now filled with vegetation, so that one may walk all over its surface. The centre fifteen yards is brown with *Hypnum revolvens*,¹ which must comprise seventy-five or eighty per cent of the total vegetation in the centre of the marsh. Outside the area occupied by this moss no specimens of *Saxifraga Hirculus* were seen by us. The following notes on the plants associated with the *Saxifraga* may not be out of place:—

LIST OF PLANTS FOUND IN MARSH WITHIN THE AREA
OCCUPIED BY *SAXIFRAGA HIRCULUS*.

Dominant.

Hypnum revolvens.

Locally or sub-dominant.

Prunella vulgaris.*Juncus acutiflorus*.*Menyanthes trifoliata*.*Carex glauca*.

with

Ranunculus Flammula, frequent. *Bellis perennis*, abundant.*Cardamine pratensis*, frequent. *Scirpus setaceus*, frequent.

¹ A specimen of this moss was identified by the Rev. C. H. Waddell, M.R.I.A.

<i>Cerastium triviale</i> , frequent.	<i>Carex flava</i> , sub-dominant
<i>Saxifraga Hirculus</i> , common.	in places.
and	
<i>Pinguicula vulgaris</i> , occasional.	<i>Carex panicea</i> , occasional.
<i>Taraxacum officinale</i> , rare.	<i>C. limosa</i> , common round
A species of Hepatic belong-	edge.
ing to the <i>Marchantiales</i> group.	<i>C. Goodenovii</i> , occasional.

LIST OF OTHER PLANTS FOUND IN THE MARSH, BUT OUTSIDE
THE AREA OCCUPIED BY SAXIFRAGA HIRCULUS.

<i>Linum catharticum</i> .	<i>Potamogeton polygonifolius</i> .
<i>Sagina procumbens</i> .	<i>Triglochin palustre</i> .
<i>Drosera rotundifolia</i> .	<i>Schoenus nigricans</i> .
<i>Epilobium palustre</i> .	<i>Carex ampullacea</i> .
<i>Vaccinium Oxycoccus</i> .	<i>C. pulicaris</i> .
<i>Selaginella selaginoides</i> .	

LIST OF PLANTS FOUND IN MOORLAND SURROUNDING
MARSH WHERE SAXIFRAGA HIRCULUS GROWS.

Dominant.

Calluna vulgaris.

Sub-dominant.

<i>Molinia caerulea</i> .	<i>Scirpus caespitosus</i> .
	with
<i>Viola palustris</i> .	<i>Carex ampullacea</i> .
<i>Polygala vulgaris</i> .	<i>C. stellulata</i> .
<i>Potentilla Tormentilla</i> .	<i>C. panicea</i> .
<i>Agrostis vulgaris</i> .	<i>C. Goodenovii</i> .
<i>Poa</i> (?) <i>pratensis</i> .	<i>C. pulicaris</i> .

The following plants which occur in somewhat similar marshy spots in the neighbourhood were noted as absent from the above spot :—

<i>Galium saxatile</i> .	<i>Pinguicula lusitanica</i> .
<i>Drosera anglica</i> .	<i>Pedicularis sylvatica</i> .
<i>Erica Tetralix</i> .	<i>Narthecium ossifragum</i> .

SOME NOTES ON RARER IRISH PLANTS
IN CULTIVATION.

BY R. LLOYD PRAEGER.

AT one time or another I have had in cultivation many of our rarer Irish plants, and possibly the following discursive notes on them may be of interest to some readers. It may be premised that the soil in my garden in Dublin is light, loamy, and limy; the plants never suffer from excessive moisture, but often from drought; plants which naturally affect damp ground, such as *Trollius*, *Meadow-sweet*, *Astilbe*, *Mimulus*, speedily die out unless planted in tubs without drainage; while the limy nature of the soil precludes the cultivation of *Heaths*, *Pyrolas*, *Ledums*, and so on, except in specially prepared peat beds.

To begin with alpine and mountain plants, which are always favourites; many of these, such as *Thalictrum alpinum* (from South Mayo), *Alchemilla alpina* (from Lough Ouler), *Saxifraga aizoides*, *Sedum Rhodiola*, *Polygonum viviparum* (from Ben Bulbin), *Oxyria digyna*, *Salix herbacea*, *Poa alpina* (from Brandon) give no trouble, and make neat and ornamental plants. *Draba incana*, *Arenaria verna* and various *Hieracia* sow themselves freely—the last almost too much so. *Dryas octopetala* and *Arctostaphylos Uva-ursi* make large mats when established, but are rather slow to start on account of the difficulty of collecting small rooted plants. *Saussurea alpina* (from Clare Island) and *Vaccinium Vitis-Idaea* (from Mount Leinster) make fine clumps in peat, but my peat gets too dry for *Rubus Chamaemorus* (from Norway), and *Saxifraga nivalis* (from Ben Bulbin). *S. Hirculus* (from Garron Point) and *S. stellaris* did well with me for some years in wet peat in a tub. *Silene acaulis*, a great difficulty in many gardens, will grow anywhere with me. *Saxifraga oppositifolia* (from Ben Bulbin) makes a large mat, much smaller in growth and with fewer flowers than most of the cultivated forms. Of *Juniperus nana* I introduced a small piece of a particularly prostrate form from Connemara; it is now two feet high, growing quite upright with short spreading branches, and

spreading leaves. *Saxifraga decipiens* from Clare Island is a valuable plant in the garden, forming a striking cushion of soft greyish green. Of alpine ferns, *Polystichum Lonchitis* and *Asplenium viride* give no trouble.

Of Connemara plants, the three famous heaths, along with the hybrid *E. Stuarti* and the double *E. Mackaii* (known as *E. Crawfordii*) flourish in dry peat. *Arabis ciliata* grows tall, and sows itself. *Ajuga pyramidalis* (from Bunowen, near Slyne Head) is a wanderer, appearing constantly in new places on the shady side of beds. *Allium Babingtonii* is a nuisance unless all bulbils are removed before they get a chance of falling.

To take the Burren plants next: *Helianthemum vineale* and *Astragalus Hypoglottis* are easy and pleasing. *Asperula cynanchica* sows itself abundantly. *Potentilla fruticosa* should be in every garden. *Neotinea intacta* I have had now for seven years; it has outlived all my other Irish Orchids. *Ophrys muscifera* and *Epipactis atrorubens* lasted only a couple of seasons with me; and with *Spiranthes autumnalis* I could not succeed at all, nor with *O. apifera*, which is notoriously difficult.

Among the plants brought from the South-west, the numerous hybrids and varieties of *Saxifraga umbrosa* and *S. Geum* are very interesting. *Pinguicula grandiflora* is difficult to keep through the winter, because the roots as well as the leaves die off, and the little bulb-like buds get loose and perish. I am growing it under a mat of *Anagallis tenella* to keep the plants in place, and this device promises success. *Euphorbia hiberna* is a very handsome spring plant in the garden. *Sisyrinchium angustifolium*, and its ally *S. californicum* (from Wexford), while sowing themselves freely, show no inclination to spread widely, but form compact colonies. *Asplenium Adiantum-nigrum* var. *acutum* seems very sensitive to light, and only succeeds in deep shade; I never found it wild save in quite shady situations. *Sedum dasyphyllum* (from Cork) is established on my garden wall, and makes very dainty patches of pinkish gray, contrasting with the bright green and purple of *Erinus alpinus* from Downpatrick.

From Ben Bulbin came *Arenaria ciliata* and *Polygala grandiflora*. The former makes a most dainty cushion loaded with flowers, of which the slugs are very fond. I have found it hard to establish any of the Milkworts, but *P. grandiflora*, once established, has sowed itself about.

Plants from the North include *Scilla verna*, which is a pleasing and easy little plant. *Rosa hibernica* has formed a large bush, which fruits freely. *Circaca alpina* is curiously enough a common weed in northern gardens, and a troublesome weed too, getting into the centre of a clump where it is impossible to eradicate it. *Poterium officinale* from Donaghadee grows freely, and *Carum verticillatum* is worth growing for sake of its elegant foliage; my present plants came from the Pyrenees. So far I have not succeeded well with any of the Irish Pyrolas, on account of the difficulty of securing well-rooted pieces: but *P. rotundifolia* var. *arenaria* from near Southport grows freely. *Spiranthes Romanzoffiana* I twice tried, making a little wet bog for its accommodation, but slugs could not be kept from it. *Carex Buxbaumii* I obtained from Glasnevin Botanic Gardens, where no doubt the stock is derived from original specimens collected on Lough Neagh by Dr. Moore; it runs about extensively, and has to be ruthlessly weeded out each season. My garden is too dry for *Trollius europaeus*, which I brought from Lough Melvin. *Linaria repens* from near Rostrevor proved a pestilential weed.

Maritime plants mostly do well in my light soil. *Glaucium flavum* and *Statice occidentalis* increase by natural seeding. *Euphorbia portlandica* grows exuberantly, *E. Paralias* not so freely. *Convolvulus Soldanella* grows easily in sand, but is difficult to flower. *Artemisia maritima* makes a beautiful mass of silvery gray, and sows itself. *Mertensia maritima* is lovely, but slugs are inordinately fond of it. *Atriplex portulacoides*, *Crithmum maritimum*, *Inula crithmoides* and *Diotis candidissima* languish, and I have not succeeded in making them feel at home.

Of other plants, mostly from the east or centre of Ireland, the following may be mentioned:—*Viola lutea* (from the Dublin hills) is a delightful plant in cultivation, with a pro-

fusion of flower. *Hypericum hirsutum* and *Agrimonia odorata* flourish, but are not interesting in the garden. *Inula salicina* from Lough Derg is quite a weed, making an extensive network of underground stems from which arise a grove of annual flowering shoots. *Scrophularia umbrosa* from the Liffey grows quietly, producing seedlings each year. My soil is too dry for *Wahlenbergia hederacea*, and perhaps also for *Teucrium Scordium*, which has not grown; but curiously enough *Carex Pseudo-cyperus*, mostly found in very wet places, grows, and has even seeded itself. *Lastrea Thelypteris* also, is making headway in a particularly dry spot. *Thymus Chamaedrys* is very showy in the garden, and a white form from Killough, in Co. Down, makes a fine snowy carpet. *Colchicum autumnale* from Kilkenny has too much leaf and too little flower to be a valuable accession in the garden. The rare *Lastrea remota* from S.E. Galway does well in half shade. *Glyceria festucaeformis*, from Strangford Lough and the Shannon, stood for a year, and produced seedlings, but the ground was too dry for it, and it died out.

Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Hoolock Gibbon from eleven members of the Council, a Galago from Dr. A. Merrin, a Brown Bear (Chinese Turkestan) from Captain Bury, a Rabbit from Mr. S. Gibson, a Hooded Crow from Mr. W. Eddison, a pair of Pigeons from Mr. G. Mitchell, a Ring-Dove from Mrs. Barry, a Wood-Pigeon and a Grass Parrakeet from Mr. S. Leonard, two Peacocks, a Peahen and Chicks from Mrs. Lyster Smythe, and a Sparrow-hawk from Mr. J. Duggan. Many gifts of fruit and vegetables for feeding the animals have been received; owing to the present high prices of food and the reduced receipts of the Society on account of the war, such gifts are most acceptable to the Council.

The Hoolock Gibbon is a remarkably fine specimen, very tame and able to perform many clever tricks. Its arrival makes it possible for visitors to see, for the first time in Dublin, all four types of Anthropoid Ape together—Gorilla, Chimpanzee, Orang and Gibbon. It is indeed doubtful if such an assembly has ever been found in any menagerie.

BELFAST NATURALISTS' FIELD CLUB.

JULY 11.—EXCURSION TO DRUMAHAIRE.—On this date the annual "long excursion" of the above Club commenced, the members, under the conductorship of N. H. Foster, starting from Belfast by the 9.30 a.m. train, their numbers being augmented *en route* till they amounted to eighteen on arrival at Enniskillen. Here the party were entertained to lunch on the Fort Hill by Thomas Plunkett, M.R.I.A., an Honorary Member of the Club, and afterwards resumed their journey to Drumahaire. On arrival the President, R. Ll. Praeger, and Mrs. Praeger were awaiting them, and the party were driven to the Abbey Hotel. After tea the cars were remounted, and a short drive brought the party to the landing stage on the River Bonnet, where a motor boat was waiting, and in a short time the members were speeding down Lough Gill and viewing the entrancing scenery of the eastern end of this lake. The afternoon was spent cruising in Lough Gill, a short halt being made to enable the members to collect on Goat Island, where that rare fern *Polypodium semilacerum* was found. Many birds were observed on the lake, but interest chiefly centred in the broods of Teal and Red-breasted Mergansers which, in company with their parents, were seen at close quarters. On reaching the landing-stage the cars were again mounted and the party returned to the hotel for dinner at eight o'clock.

No programme was fixed for Sunday, and the members were free to spend the day in whatever way best agreed with their inclinations. Some went to church or strolled about the village and its environs, while most of them paid a visit to the extensive ruins of Creevelea Abbey (close to the hotel), a Franciscan monument in a good state of preservation.

Some of the party paid a visit to the far-famed Glencar, with its waterfall and Swiss Valley, and returned delighted with their long day's outing.

At 9.30 on Monday morning the party left the hotel in cars bound for the southern shore of Lough Gill. On reaching the head of Slish Gap, an eroded valley due to the weathering down of a pre-Carboniferous dyke of soft serpentine in the metamorphic rocks, a halt was called, and, after a half-hour devoted to collecting, the President briefly described the geological features of the district. Mr. Praeger then proceeded to demonstrate the differences in the fauna and flora easily recognisable in the plants growing in the metamorphic area as contrasted with that in the neighbouring calcareous strata. He also exhibited a number of the most interesting plants collected within a few yards' distance, these including the Bog-asphodel, the Mountain Everlasting, nine species of orchids, and that rather local fern, the Moonwort. Again mounting the cars, the members drove down Slish Gap to the shore of Lough Gill, on the way observing the profusion of bloom on many plants such as the Valerian, *Convolvulus*, *Rosa arvensis*, *Mimulus*, and the Purple Loosestride, while several fine clumps of the Royal Fern were noted. On reaching the shore of the lake, the members had an hour's interval for collecting till lunch was served, after which some of the party walked to Doonee Rock. Others climbed the hill behind Doonee. Most of the party, however, spent the time in Slish Wood, where many treasures were collected. The profusion

of vegetation in this wood was marvellous, and ferns of many species were seen. In this group the dominant species was doubtless *Lastrea aemula*; but *L. Filix-mas*, *L. dilatata*, *Asplenium Adiantum-nigrum*, *A. Trichomanes*, *Scolopendrium vulgare*, *Polystichum angulare*, *Pteris Aquilina*, *Ceterach officinarum*, *Blechnum Spicant*, *Polypodium vulgare*, and the Filmy Fern, *Hymenophyllum unilaterale*, were also noted. A heavy thunder shower drove most of the members to various shelters, but by the time of departure the rain had ceased, and the members returned to Drumahaire in brilliant sunshine. After dinner the usual business meeting was held, and the conductor made several announcements relative to the proceedings for the morrow. The excursion had been arranged to terminate by departure from Drumahaire on Tuesday afternoon, but by unanimous consent it was decided to postpone the departure till Wednesday morning, thus affording a longer time for the Tuesday's programme. Starting at nine o'clock from the hotel, the party was driven to Sriff Point, a limestone promontory at the eastern end of the lake, and here given an hour for collecting. Remounting the cars, members were driven to O'Rourke's Castle, an extensive ruin on the northern shore of the latter. Here the members had time for an hour's collecting on the lake shore or in the woods till lunch was served in the castle, and concluded in a drenching downpour. On the almost simultaneous conclusion of lunch and rain the party were conducted to the entrance to Newtown Alt, a glen which, in the opinion of all the members, exceeds in beauty any of the glens with which they were acquainted. This glen, provided with a well-made path, ascending the hill for almost a mile along the now dry river's bed, which was clothed with mosses looking their very freshest after the heavy rain of the previous night, has its sides embowered with various species of ferns and many flowering plants in wild luxuriance. The sides, now perpendicular cliffs and anon sloping banks, rise to an altitude of about two hundred feet from the bed of the stream, and as one climbs the easy gradients of the winding path fresh beauties are revealed at every turn. Strange it is that this glen, so easy of access from Mr. Jeiter's comfortable hotel, is apparently little known. On reaching the road at the top of the glen the cars were waiting, but a heavy downpour drove all to shelter for upwards of an hour, and the party returned direct to the hotel for dinner.

On Wednesday morning the party left by the 10.53 train. On arrival at Enniskillen, where there was an hour's wait, the members were entertained to tea, and departing from Enniskillen at 1.30 reached Belfast at 5 o'clock, experienced "long-excursioners" maintaining that never had this one been surpassed.

Large collections in many groups were made, and the scientific details of the excursion will be published in the Club's proceedings. It is known that many new county records have been obtained, both for Leitrim and Sligo, among which may be mentioned the finding in Leitrim of the American Blue-eyed Grass, *Sisyrinchium angustifolium*, this discovery further confirming the idea that this plant is a true native species.

CORK NATURALISTS' FIELD CLUB.

JUNE 13.—POND-HUNTING EXCURSION.—A party of members, conducted by Prof. Hartog, walked from St. Luke's Cross to "Bennett's Bog," near Mayfield, which, owing to the prevailing drought, was found to be partially dried up. In the bog and in a stagnant pool near it were found Spirogyra, gnat larvac, and Catenula in abundance, as well as Arcella, Diffugia, and Euglena. From a spring well a large quantity of Oscillatoria was obtained.

JUNE 17.—EXCURSION TO CARRIGROHANE.—Prof. Swain gave a detailed account of the formation of the "river-terraces" of the Lee to a party of members who had travelled out by train. Walking back to Cork by Inchigoggin Lane, attention was drawn to the magnesian limestone quarry south of the Old Ballincollig Road, from which, up to a short time ago, a local mineral water factory derived its supply of magnesia. Near the Munster Institute, at the northern end of "Kate Shea's Lane," a fine deposit of Boulder-clay, containing striated stones, was met with, and in the quarry south-west of Dennehy's Cross "bedding" was explained, and examples of flint and red marble were shown.

JULY 1.—EXCURSION TO HARTLANDS' NURSERIES.—Mr. J. S. Treseder showed a large party over the nurseries at Ardcairn, Ballintemple. An examination of Beaumont quarries, which lie south of the nurseries, was reserved for another occasion.

JULY 15.—EXCURSION TO INCHERA.—A pleasant afternoon was spent at Inchera, near Dunkettle station, when the members were shown over the grounds and gardens by permission of Mr. Charles E. Murphy. A fine specimen of the Flame Tree (*Embothrium coccineum*), was seen in flower. The party walked to Little Island station, from which they returned by train, visiting Wallinstown Castle, also the old church and pretty lake in the demesne near it, on the way. Here, and at Inchera, the remains were found nearly as Crofton Croker described them in the thirties.

AUGUST 12.—EXCURSION TO OVENS CAVES.—A party of twelve, conducted by T. Farrington, M.A., and James Noonan, travelled to Killumney station. The entrance to the caves is about a mile distant, and nearly halfway between Athnowen Church and Ovens Bridge. The members were here supplied with bicycle lamps and candles. Twine was paid out as they went along underground, as a precaution against losing their way on returning. The south-eastern gallery only was fully explored. At its end the murmuring of the River Bride could be distinctly heard overhead. Mass used to be celebrated at this spot in Penal times. Curious honeycomb-like markings on the walls of the caves are attributed to the action of gravel borne along by floods. Leaving the caves the members walked to Ballincollig (three miles), and visited Ballincollig Castle. [Notes on these caves appeared in *I. N.*, xx., 179-180].

NOTES.

ZOOLOGY.

The Death's-head Moth in Northern Ireland.

The Death's-head Moth and its caterpillars may be found in most summers in the southern counties of Ireland; this year it has appeared in several northern localities. Besides the moth recorded by Rev. W. F. Johnson from Co. Armagh (pp. 225-6), a specimen was caught at Dowros, Co. Donegal, in September by Mr. F. B. Dixon, while a caterpillar was taken near Drogheda by Mr. W. Osborne.

G. H. CARPENTER.

Royal College of Science, Dublin.

Wasps preying on Sawfly Caterpillars.

Early in the month of June, 1914, I noticed that the gooseberry bushes in my garden had been attacked by great numbers of grubs of the Gooseberry Saw-fly (*Nematus ribesii*). When taking steps to get rid of them by picking and spraying I noticed that these larvae were the subject of the attentions of various queen wasps. On examination these proved to be mainly *Vespa rufa* var. *austriaca*, together with *V. norvegica* and a very few *V. germanica*. About the 20th these queens were supplemented by numbers of workers of *norvegica*, and a few workers of *rufo*. I located one nest of the latter in the Botanic Gardens of Trinity College, about half a mile distant, but there must be many others in the neighbourhood. Later on I should expect that the males of *V. rufa* var. *austriaca* will be abundant here. I saw them in numbers on the flowers of Umbelliferae in Co. Wexford last year, during August.

H. G. CUTHBERT.

Dublin.

Skuas on Lough Arrow, Co. Sligo.

I am informed by Mr. D. P. Hope Johnstone, of Laragh, Maynooth, Co. Kildare, that on June 6th, 1914, whilst fishing on Lough Arrow he observed and photographed a Long-tailed Skua. "The bird was exceedingly tame, and after the photos had been taken, and all the films used, it swam up within about six feet of the boat, and took a Mayfly on the water." He also observed a Richardson's Skua on May 31st, 1914; "it flew past about eighty yards from the boat, and did not settle; the day was very stormy, and it was impossible to keep it under observation for long." Mr. Hope Johnstone asked me to make any use I liked of these records, so I send them, as they may be of sufficient interest to insert in the *Irish Naturalist*.

HELEN M. METCALFE,

Enfield, Co. Kildare.

Breeding of Canada Goose at Hillsborough, Co. Down.

About twenty years ago a pair of Canada Geese, *Bernicla canadensis*, came to Hillsborough Park and bred near the lake. They were said to have escaped from Castlewellan demesne, where, I am told, this bird is kept. Since their advent here one or two pairs have nested almost every year. Two broods were successfully hatched off this year. The birds are not protected in any way save for the security of their habitat—inside a private walled-in park—and exist in a truly feral condition. They frequently fly about the surrounding country and many of them have fallen victims to the sportsman's gun. The birds, unlike those at Ballydrain, seven miles distant (p. 228 *ante*), appear to remain in the vicinity of their nesting ground all the year.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

Tree Pipit in Ireland.

On the 21st May, close to Portumna Bridge, on the Shannon, I heard a bird singing in a solitary tree in the centre of a field. On approaching and listening for some time I identified it as a Tree Pipit by its melodious song, as I frequently heard this species singing in Wales. It was taken at the Tuskar by Professor Patten, September, 1912, and received from Rockabill by Mr. Barrington, September, 1913. I do not think this species has yet been obtained in any of the inland counties of Ireland.

W. J. WILLIAMS.

Dublin.

Late Stay of the Fieldfare.

One of our local birdcatchers brought me a Fieldfare on the 15th July he had taken in a net the previous night. The bird was in good condition, and uninjured. Mr. Pycraft kindly examined the body, and reported it as a male, but no indications of having bred this year.

W. J. WILLIAMS.

Dublin.

GEOLOGY.

Estuarine Clay Section at Holywood.

During a visit to the gasworks at Holywood, Co. Down this month (September) I found contractors busy at the foundations for a new vertical retort house. This system requires a very deep pit to be dug for the coal-elevating machinery, and the foreman in charge gave me the following notes of the beds passed through:—

Garden soil, 6 to 8 inches.

Mottled red and grey clay, 2 feet 6 inches.

Sandy blue clay, 4 feet.

Unctuous blue clay, very pure and free from shells, 30 feet.

At base of the latter large oyster shells were numerous in a hard grey sand, two feet thick, resting on hard red clay. I could find no other shells in the material I examined. The sandy blue clay had a few shells in a very fragmentary condition. I got one perfect valve of a small bivalve. The mottled red and blue clay had many fragments of chalk; and of course the surface soil had some of the usual Kinnegar rude (Neolithic ?) flints and also chalk fragments.

R. J. WELCH.

Belfast.

REVIEW.

THE BIRDS AND THE SCHOLARS.

Bird Studies in twenty-four Lessons. By W. P. WESTELL, F.L.S., M.B.O.U., late Lecturer in Nature Study to the Cambridgeshire County Council. (Cambridge Nature Study Series). Pp. 152. Price 2s. 6d. net.

This little book consists of twenty-four "lessons," not so much on birds as on how to study them, arranged in the order of the seasons, and written, as Mr. Westell tells us, for the use of young people and their teachers in schools where nature study is included in the curriculum. The author says he has found the lessons helpful to his own classes; and certainly any student who, as he goes through the book, sets himself to solve the series of "problems" appended to each of the lessons will, long before he has finished, have learnt to make pretty good use of his eyes when out in the fields. On the other hand, the boy who was expected to answer so many questions in writing at the end of each walk would with equal certainty, in nine cases out of ten, vote bird-study as great a plague as trigonometry. Some of the "lessons" are rather thin; that on the making of census maps for nesting birds is perhaps the best, and an interest in this subject would undoubtedly save a good many of our birds the misfortune of being robbed. The author adds a list of books recommended for popular and school use. It is a serious fault in this list that so many of the wonderfully cheap and really good books which are now given to the public through the medium of shilling and sixpenny "Libraries" appear to have been wilfully ignored. For instance, Pycraft's *Bird-Life*, in Hodder and Stoughton's "Useful Knowledge Series," and Kirkman's *British Birds*, in E. & C. Jack's "People's Books," are unmentioned, though larger and more expensive books by the same authors are duly honoured; and it is equally singular that while recommending Jefferies's *Gamekeeper at Home*, Mr. Westell should only name a 10s. 6d. edition, though the book (with all its original illustrations) is obtainable for a shilling in the well known Nelson series, and has several other editions much below the price quoted. White's *Selborne* seems to be the only book for which the author has gone out of his way to name a cheap edition, and here it would be hard to give any reason for the selection made.

C. B. M.

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NOTICE.

CONTRIBUTIONS (Articles or Notes) on all branches of Irish Natural History are invited. Articles must reach the EDITORS, on or before the 10th of the Month, for insertion in the succeeding number. Short Notes will be inserted, if space permit, if received before the 15th of the Month. Contributors are earnestly requested not to write their communications on Postcards.

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BIRD RUSHES AND WRENS.

BY R. M. BARRINGTON, M.A., F.L.S.

On the night of the 16th-17th of October of this year the moon was in her dark phase, and the sky was overcast. For certain birds the period of what might be called the maximum density of their autumnal migration was near. Therefore it might reasonably be anticipated that a considerable rush would be observed at light stations.

This proved to be the case, and a remarkable immigration into Ireland took place along a coast-line of over 270 miles, extending from the Fastnet on the south coast, past the Tuskar Lighthouse and the South Arklow Lightship, to Rockabill on the east coast. A single specimen from South Rock, Co. Down, proved that the dimensions of the wave of migrants had there dwindled to the vanishing point.

Commencing with the Fastnet, the well-known Co. Cork lighthouse, eight miles from shore, the lightkeeper, Mr. Murphy, writes :—

“ On the night of the 16th and morning of the 17th of October, a great flight of birds took place. There were thousands flying through the rays of light the whole night through until about an hour before sunrise, when they gradually disappeared. Blackbirds and Thrushes appeared to be present in greatest numbers, but Landrail [probably Water-Rail.—R. M. B.], Chaffinches, Wrens, Waterhens, Pigeons, Woodcock, Larks, and Starling were also observed. Curlew and Golden Plover were heard whistling overhead. About 40 Blackbirds and Thrushes were killed striking, and I captured a Golden-crested Wren and a Redbreast perched on the sash bars, but released them. Wind N.E., light, cloudy, misty.”

No specimens were forwarded.

The lightkeeper at the Tuskar, Mr. Johnston, describing the rush at that station, writes :—

“ I beg to state that on the night of the 16th and morning of the 17th inst., between 10.30 p.m. and 2 a.m., a large lot of birds were about lantern, the majority of them Thrushes, Blackbirds, Starling, Chaffinches, a few Redcrest Wrens

[Goldcrests.—R. M. B.], also a great flock of the common brown Wren, and Larks. Next morning, everywhere you looked on the rock you would see the Wrens, and on Sunday morning, October 18th, before daylight, they had all left. Wind very light N.E.; overcast, gloomy.

“When going around the rock on Sunday at 2 p.m., I came close to a large brown owl, but it got away. I saw a Black Redstart and Snipe, and also a lot of Chaffinches. Some remained on rock, and are dying, owing to there being no fresh water.”

He forwarded 72 birds, comprising 13 distinct species, viz. :—

Chaffinch	(8)	Stonechat	(1)
Wren	(10)	Blackbird	(6)
Goldcrest	(2)	Golden Plover	(1)
Skylark	(34)	Grey Plover	(2)
Snipe	(1)	Starling	(3)
Black Redstart	(1)	Thrush	(2)
Redwing	(1)		

Of the 34 Skylarks, 9 were males, 23 females, and 2 doubtful. Of the Chaffinches, one was male, and 7 female. Of the Wrens, one was male, 4 female, and 5 doubtful.

This great variety of species all migrating together on the same night is not unusual. About a year before, when the moon was also in her dark phase, on the 28th, 29th, and 30th September, 1913, Mr. Martin Kennedy, lightkeeper at the Fastnet, forwarded 97 birds killed striking the lighthouse. They consisted of the following 16 species :—

Ring-ouzel	(3)	Grasshopper Warbler	(2)
Water Rail	(11)	Robin	(1)
Storm Petrel	(1)	Greenfinch	(2)
Thrush	(1)	Goldfinch	(1)
Wheatear	(62)	Goldcrest	(1)
Pied Wagtail	(5)	Garden Warbler	(2)
Grey Wagtail	(1)	Skylark	(1)
Sedge-warbler	(2)	Meadow Pipit	(1)

This rush was also observed at the Tuskar, 160 miles to the east, where the lightkeeper, Mr. Glanville, notes :—

"Swarms of Goldcrests, Chiff-chaffs, Whitethroats, Skylarks, Thrushes, Wheatears; a few Blackbirds, Ring-ouzel, Grasshopper Warblers, Stonechats, Pipits, Black Redstarts; and Starling, Quail and Wren, one specimen of each, obtained on night of 28th Sept. Wind N.E. Cloudy, misty." Though 15 species are here mentioned, no specimens were forwarded.

The four records from the two light-stations, Fastnet and Tuskar, are tabulated below.

SPECIES.	1913.		1914.	
	<i>Fastnet.</i> 28th September (a)	<i>Tuskar.</i> 28th September (b)	<i>Fastnet.</i> 16th-17th October. (c)	<i>Tuskar.</i> 16th-17th October. (d)
Thrush	×	×	×	×
Redwing				×
Blackbird		×	×	×
Ring Ouzel	×	×		
Wheatear	×	×		
Stonechat		×		×
Black Redstart		×	×	×
Redbreast	×			
Whitethroat		×		
Garden Warbler	×			
Golden-crested Wren ..	×	×	×	×
Chiffchaff and Willow Wren.		×		
Sedge Warbler	×			
Grasshopper Warbler ..	×	×		
Wren		×	×	×
Pied Wagtail	×			
Grey Wagtail	×			
Meadow Pipit	×	×		
Greenfinch	×			
Goldfinch	×			
Chaffinch			×	×
Starling		×	×	×
Skylark	×	×	×	×
Quail		×		
Water-rail	×			
Water-hen			×	
Golden Plover			×	×
Grey Plover				×
Woodcock			×	
Snipe				×
Curlew			×	
Storm Petrel	×			

(a) 97 specimens, comprising all species marked ×, received.

(b) No specimens sent.

(c) No specimens sent.

(d) 72 specimens, comprising all species marked ×, received.

It will be noticed that the Thrush, Goldcrest, and Skylark are the only species common to all four records. The absence of the Warblers in October was to be expected; but what strikes one most is, perhaps, the heterogeneous collection of birds assembled around the light-station on the same night.

We must not infer from this that they migrate in company; Goldcrests and Storm Petrels, Wrens and Curlew are not usual companions either in habits or speed, but the mist and darkness puzzle them all, and the brilliant glare of the lantern is a common attraction in the overwhelming gloom.

Probably the most remarkable event in the rushes above described is the occurrence of so many Wrens at the Tuskar Rock—ten of which were forwarded in the flesh. In this connection it will be interesting to compare Prof. Patten's remarks on "Wrens on Migration observed at the Tuskar Rock and Lighthouse."¹ He deals mainly with four points in connection with this species, viz. :—

1. The limited number forwarded to me from light-stations.
2. Its migration route.
3. Its power of flight.
4. The relative proportion of the sexes when on migration.

His explanation of the limited number received is possibly correct, and my suggestion² that the short passage between the S.W. of Scotland and Antrim was the usual route of the Wren (if it had one) between Ireland and Great Britain is perhaps based on insufficient data.

As to its power of flight, if Wrens cross the Channel on migration regularly every Spring and Autumn, it shows that the shortest-winged British bird has unexpected powers of flight. The ratio between the length of the wing and the weight of the body is small, the flight direct, the wing-beats energetic and rapid, and the "work done" in its

¹ *Irish Naturalist*, vol. xxi., 1912, p. 125.

² "Migration of Birds," p. 92.

shortest flight across the Channel, which is at least 50 miles; compared with the weight of muscular tissue, must be extraordinary.

I have already stated that the word "Wrens," which is of common occurrence in the schedules, is used by light-keepers to include all the Warbler group, and even Goldcrests, so that when drawing conclusions as to the frequency of the Wren, I preferred to rely entirely on specimens actually received. Because these were so few, and the Wren's power of sustained flight apparently so small, it was inferred that its cross-channel flights, if they took place at all, were of an isolated and exceptional character. However, Professor Patten's interesting records from the Tuskar, and the ten specimens just received from that station, require explanation.

If the Wren be a regular migrant, how are we to explain such local varieties as the St. Kilda Wren, and the Faröese Wren, for which isolation for a lengthened period is essential?

St. Kilda is only 52 miles west of Harris, just about the same distance as the Tuskar from Wales. It is true that Faröe is over three times that distance from Shetland; but if the Wren be indeed a regular annual migrant, over 50 miles of the Irish Channel, could it not occasionally have flown to St. Kilda or to Faröe and thereby prevented the evolution of racial characters?

Are not the Irish Jay, Coal Tit, and Dipper the result of isolation and special environment? There is no evidence that those species ever migrate across the Channel, and if the British Wren travelled even occasionally to St. Kilda and Faröe, would the varieties in these islands be now obtainable?

In my collection, there are skins of Icelandic, Faröese, and St. Kilda Wrens, all of which differ slightly, and even the Shetland Wren is, I think, an intermediate link between the British and Faröese races. But if this little bird takes sea-voyages of fifty miles regularly why do these distinctions present themselves? Can it be that there is another solution of the difficulty? Can it be possible that

occasionally in Spring a number of mainland Wrens, finding all the suitable nesting-sites occupied by stronger members of the same pugnacious species, travel seawards to the Tuskar as a forlorn hope ?

The Wren inhabits and breeds on more islands and rocks than possibly any other British bird. In Iceland, it is called the " Mouse's brother," for it lives in cracks, crevices, and holes. Therefore a voyage to an outlying rock is not such an adventure for a Wren as might be supposed.

In the Autumn, again, it is evident, the wren population has enormously increased, for the families are large, and the parents will not tolerate any subdivision of their little holdings, and while able to do so, force the youngsters to travel elsewhere or emigrate. Confident of their ability to sustain life during the winter on bleak and inhospitable looking islands, they travel along the coast in search of a home, and at the extreme S.E. of Wexford, the southern and eastern voyagers meet, and selecting a dark night, so as to be safe from Gulls and Skuas, they reach the Tuskar, which contrary to expectation affords neither suitable food nor shelter. Here, tired and hungry, they become an easy prey in the daytime for some marauding Seagull, to whom a dozen Wrens are scarcely more than a good mouthful.

A friend has drawn attention to the fact that during the past thirty years, not a single Wren has ever been received from a lightship ; all the specimens, about thirty in number, have been forwarded from rock stations.

The Golden-crested Wren, on the other hand, has over and over again been killed or captured on lightships. Why should this be ? and why is it that Lucifer Shoals Lightship and Blackwater Bank Lightship, both north of the Tuskar, and Barrels Rock Lightship and Coningbeg Lightship to the south of it have never forwarded a Wren ? and yet on the 17th October last, " a great flock of the Common Brown Wren " is recorded from the Tuskar, and ten specimens forwarded in the flesh as evidence of the fact.

WRENS RECEIVED FROM LIGHT-STATIONS BY R. M.
BARRINGTON.

STATION.			Date.	How Procured.
Fastnet	..	..	30th Oct., 1897 ..	Killed striking.
Do.	..	..	30th Oct., 1897 ..	do.
Tuskar	..	..	16th Oct., 1888 ..	do.
Do.	..	..	20th Oct., 1911 ..	do.
Do.	..	..	21st Oct., 1911 ..	do.
Do.	..	..	16th-17th Oct., 1914	Ten wrens found dead
Rockabill	..	..	25th April, 1905 ..	Found dead.
Do.	..	..	12th April, 1912 ..	Killed striking.
Maidens	..	..	12th-13th May, 1899	do.
Do.	..	..	19th Nov., 1898 ..	do.
Inishtrahull	..	..	Rec. 4th April, 1896	?
Do.	..	..	Rec. 10th April, 1894	?
Blackrock, Mayo	..	..	1889	Found dead.
Eagle Island	..	..	14th Nov., 1884 ..	Killed striking.
South Aran	..	..	21st Oct., 1898 ..	do.
Tearaght	..	..	1st Jan., 1891 ..	Found dead.
Do.	..	..	15th Oct., 1889 ..	do.
Skelligs	..	..	16th Nov., 1885 ..	?
Bull Rock	..	..	29th Oct., 1914 ..	Found dead.

Fassaroe, Bray.

NEWS GLEANINGS.

THE BELFAST FIELD CLUB'S JUBILEE.

The *Report and Proceedings* of the Belfast Naturalists' Field Club for 1913-14, recently issued, contains a very full and interesting account of the meetings and excursions held in May, 1913, in connection with the fiftieth anniversary of the founding of the Club. The speeches delivered by delegates and members at the formal meeting which opened the week's programme are given in full, and are very interesting reading. Accounts of the excursions, reports of the several lectures delivered, and notes on the rarer animals and plants observed on the excursions by the many specialists present are also given, with photographs of some of the more striking scenery of the places visited. This publication, which runs to 136 pages, can be obtained through members for 2s.

NOTES.

ZOOLOGY.

Trichoniscus vividus in Co. Kerry.

Mr. A. W. Stelfox sent me several specimens of the Woodlouse, *Trichoniscus vividus* (Koch), taken by him in Kerry, S. Mr. Stelfox says :—“The first specimens were taken under a very rotten log near the bank of a small stream in the plantations of Burnham, Lord Ventry’s demesne, on Dingle Harbour. Many other examples were seen here, but all under very rotten wood. These plantations are mainly artificial, but in some parts there is, I fancy, a foundation of native scrub. In them are many exotic shrubs, and no doubt some species of animals have been imported with these. In one area the presence of the snail *Hygromia rufescens*, gives proof of this.” If *T. vividus* be native here—and there appears to be no reason why it should not be so—it is an interesting extension of its range. In the Britannic area it had previously only been known from south-east Ireland, having been recorded from the counties of Waterford, Kilkenny, Wexford, Carlow, and Queen’s Co.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

The Death’s-head Moth in Ulster.

Although not common, the Death’s-head Moth is well known in northern Ireland, and is regarded by the country folk with superstitious horror. I have not had the good fortune to have taken it myself, but more than one living specimen has been brought to me in former years.

W. E. HART.

Kilderry, Co. Donegal.

The Short-eared Owl.

On September 17th I saw perched on a stack of oats in a field beside the road at Kilranelagh, Co. Wicklow, an owl, which from what I saw of it whilst driving past I believe to have been a Short-eared Owl. The general appearance of the bird was dark buff above, with heavy dark brown streaks and blotches; the under parts were dull buff or yellowish, also streaked with dark brown, as was the facial disk and wings. The tufts on the head were quite short. I could not see the legs plainly, as, though the trap I was in was only going at a walk, I was not close enough to see them distinctly. Perhaps the above may be of sufficient interest to publish, as the Short-eared Owl is only a winter-visitor to Ireland, and I have never seen a specimen so early as the date on which I saw the bird mentioned.

HELEN M. METCALFE.

Enfield, Co. Kildare.

Doubtless the bird seen by our correspondent was a Short-eared Owl. This species, however, may be observed in some seasons as early as August.

THE EDITORS.

REVIEWS.

CLARE ISLAND GEOLOGY.

The Geology of Clare Island, Co. Mayo. By G. A. J. COLE, F.G.S.; J. R. KILROE, A.R.C.Sc.I.; T. HALLISSY, B.A., and E. A. NEWELL ARBER, M.A. (*Memoirs of the Geological Survey of Ireland*). Pp. iv. + 54 Map, 5 plates, and 4 text figures. Dublin: H. M. Stationery Office, 1914. Price, 2s. 6d.

In 1908 the committee in charge of the Natural History Survey of Clare Island decided to ask the assistance of the Geological Survey of Ireland in working out the Glacial and Post-glacial history of the island. This the Survey willingly consented to do, and the present memoir which deals with the solid geology (a revision of the older survey of 1875-76) as well as with the glacial geology of Clare Island, is an account of the results achieved. Regarding the revision of the solid geology—which was dealt with by Mr. J. R. Kilroe—considerable advances in our knowledge have to be noted. The rocks of the island consist wholly of sandstones, conglomerates, shales and slates of Palaeozoic age, and it had been hoped that sufficient fossil evidence might be obtained to justify their correlation with the better known rocks of the mainland. The results as regards the older rocks were most disappointing, for although prolonged searches were made in what looked like suitable localities—as at Knocknaveen and Ballytoohy More—no fossils were obtained, and the decision to regard the four lower series as ranging from the Ordovician to the Old Red Sandstone was come to on general and lithological grounds. From the Capnagower series Dr. Arber obtained sufficient, if scanty, evidence that these rocks might be classed with the Lower Carboniferous. Professor Cole contributes a series of lengthy notes on the mineralogy and petrology of the two main zones of movement and intrusion on the island, and in dealing with the zone of crushed rocks in Kill and Strake inclines to the view that these rocks—mica-schists, epidiorites, and serpentines—are metamorphics of the Dalradian series which have been brought to the surface by faulting, rather than altered portions of the local rocks involved in the fault movements.

The Glacial and Post-glacial history of Clare Island being of the greatest importance in any discussion on the origin of the plants and animals which might be found there, special attention was directed to the subject by Mr. T. Hallissy, and as the result of his work on the island and the adjoining mainland we are now in possession of an extremely full account of what has occurred during recent geological times in this district. The glacial history of the island may be briefly stated. In immediately pre-Glacial times the island stood in practically the same relation to the mainland as at the present day, though the dividing channel may have been deeper. In glacial times the island was twice invaded by ice-sheets from the east, the first invasion being the ice of the Central Irish Glacier, which laid down the very solid limestone Boulder-clay and produced the grooving

and moulding which runs in a general east and west direction across the island. The second invasion, from the south-east—laid down a Boulder-Clay much coarser and looser in texture, and largely composed of sand-stones and granite of various kinds. In early Post-glacial times it is probable that the island was joined to the mainland by a Boulder-Clay connection, and over this connection animals and plants could migrate; but taking into account the depleted flora and fauna of the mainland, its value as a factor in introducing habitants to the island is extremely dubious.

Mr. Hallissy proves the existence of a later and much more permanent land connection. By mapping the best authenticated occurrences of submerged forests and peats around the coasts of Ireland, he shows that the land at the lowest estimate must have stood between 40 and 50 feet higher than at the present day. This elevation of the land in Post-glacial times also occurred in England and France, and in Denmark was so pronounced as to have converted the Baltic Sea into a fresh-water lake which has received the geological title of the Ancylus Lake. How far to the westward the floor of the Atlantic was elevated during this Ancylus Lake period we cannot say, but it is certain that Clare Island became for a considerable time portion of Western Europe, and that it was during this connection that the island received the greater part of its present flora and fauna. The memoir is well turned out, contains a folding map which shows Mr. Hallissy's work on the superficial deposits in considerable detail, and a number of excellent photographs by Mr. R. Welch add greatly to the attraction of the work.

J. DE W. H.

LAMARCK IN ENGLISH.

Zoological Philosophy : an Exposition with regard to the Natural History of Animals. By J. B. LAMARCK [1809]. Translated with an Introduction by HUGH ELLIOT. Pp xcii. + 410. London : Macmillan and Co., 1914. Price, 15s. net.

"Few names have been so extensively quoted in modern biological controversies as that of Lamarck; yet of those who quote him scarcely any have taken the trouble to read his work." This comment of Mr. Elliot in his introduction must be admitted as the truth; it may have the less justification among us now that—a hundred and five years after its publication—he gives us the first complete English translation ever made of the famous "*Philosophie Zoologique*." In this he has deserved well of all students of the history of biological enquiry.

Even biologists who, like Mr. Elliot himself, are sceptical as to whether "use-inheritance"—that factor always associated with Lamarck's name—has been a real cause in the evolutionary process, must admit the great value of Lamarck's work as a contribution to the general evolutionary view of living nature. The man who, not taking up seriously the study of zoology, until his appointment when already fifty years of age to a professorship of zoology ("insects, worms and microscopic animals") at the *Muséum d'Histoire Naturelle*, then perceived the prime importance of the vertebral column in morphology and contrasted for the first time

Vertebrata with Invertebrata, who reduced the Mollusca to a natural assemblage, who separated the Crustacea and the Arachnida from the Insecta, was undoubtedly a very great naturalist. It is further noteworthy that, in his evolutionary speculations he began, like Aristotle, by arranging species and larger systematic groups in linear series, and arrived later at the conception of what we now call a "phylogenetic tree" with "at least two separate branches," each of which "appears to terminate in several twigs."

Lamarck's writings have been so frequently quoted and interpreted by modern naturalists engaged in controversy for or against his leading theory of "use inheritance," that it is good for the student to go to Lamarck's most famous book and find exactly what he did write in its original connection. Of course it will not be forgotten that Lamarck's theory in its final and more elaborated form—the "four laws"—is set forth in his later "*Histoire Naturelle des Animaux sans Vertébrés* (1815-22). But in the "*Philosophie Zoologique*" he ranges over the whole world of living nature as he was able to conceive it, and we can appreciate both the strength and weakness of his work for evolutionary biology. His acceptance of "spontaneous generation" was almost inevitable in the early nineteenth century, but his unwillingness to believe that any species of animal had ever become extinct except those exterminated by human agency is hard to understand. When we consider that the "*Origin of Species*"—nearer in time to the "*Philosophie Zoologique*" than to our day by fourteen years—is in its spirit nearer to us than the latter by a century, we understand to some extent why Lamarck failed to convince men generally of the truth of evolution and why Darwin succeeded.

Mr. Elliot has spared no pains in giving to the English reader a translation which, while it retains as much as possible the flavour of the lucid yet somewhat ponderous original, is intelligible in its nomenclature to the naturalist of the present day, terms like "génération" and "distribution" being translated by their modern equivalents and not by the words which an English contemporary of Lamarck might have used. Further Mr. Elliot furnishes the reader of his translation with the temptation not to read Lamarck after all, by prefacing the actual work with an incisively written critical summary. In this he shows the weakness of the use-inheritance theory, while at the same time he impartially discounts the dogmatism of the extreme followers of Weismann. The chapters on the physiological and psychological sections of Lamarck's work are trenchantly "anti-vitalistic," as might be expected from Mr. Elliot's recent controversial writings on these subjects. Here the violence of some of the statements will defeat the translator's ends. That "spirits . . . survive only in extremely mitigated form in the imaginations of the vulgar" is simply an untrue statement, and it is hard to imagine that Mr. Elliot really believes it. And the autumn of 1914 is an unfortunate time at which to sing the praise of "the rise of materialism in conjunction with the advance of civilization."

G. H. C.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Diana Monkey from Mr. L. V. Creegan ; Guinea-pigs from Miss E. Maguire ; Rabbits from Rev. K. M. Dunlop, Miss Maguire, and Mr. McArthur ; a pair of Upland Geese from Col. Tottenham , a Sulphur-crested Cockatoo from Mr. D. H. Walsh ; a pair of Grass Parakeets and a pair of Bullfinches from Mr. A. W. Berman ; and two Peafowl from the Hon. A. S. G. Canning.

DUBLIN MICROSCOPICAL CLUB.

OCTOBER 14.—The Club met at Leinster House, D. M'ARDLE (President) in the Chair.

As a sequel to his exhibit on December 10, 1913 (*Irish Naturalist*, pp. 48, 223, *supra*) when the Celery leaf-spot fungus (*Septoria petroselinii* var. *apii*) was exhibited for the first time (at any rate as far as the British Isles are concerned) attacking *wild* celery plants, Dr. G. H. PETHYBRIDGE now showed the successful results of inoculating the cultivated celery with spores derived from the pycnidia of the fungus found this summer again on wild celery plants from the previous locality in Co. Galway. Measurements of the lengths of the spores from the wild plant showed them to be slightly shorter than those from cultivated plants, and hence it might have been supposed that two different species of *Septoria* were in question. However, inoculation of the cultivated celery from the fungus on the wild plant produced in the former the symptoms typical of the leaf-spot disease as seen now unfortunately so commonly in our vegetable gardens owing, it is believed, primarily the use of affected celery seed. This suggests of course that the disease has originated in some locality by the migration of a parasitic fungus from a wild plant to its cultivated variety. This has probably occurred within comparatively recent years, and it is interesting to note that although the parasite does not very seriously injure the wild plant yet its effect on the cultivated one is often disastrous.

W. F. GUNN showed seeds of *Buttonia Natalensis*, a rare shrubby plant which is parasitic on the roots of an arborescent Euphorbia. It belongs to the order Scrophulariaceæ, and in consequence of its beautiful red flowers, which are much sought after, it has been almost exterminated in its native district in Natal. The seeds are of a brownish red colour, and surrounded with hyaline network which forms hexagonal and other shaped cavities. The seeds which were kindly presented to Mr. Gunn by Mr. N. E. Brown, of Kew Herbarium, were only secured after a long search, and were protected until ripe.

Prof. G. H. CARPENTER showed a newly-hatched larva of *Hypoderma lineatum*, which had been found in fluid squeezed from a minute hole in a cow's skin at Athenry, Co. Galway, as described in the *Irish Naturalist*, vol. xxiii., p. 219. T. R. HEWITT described his observations on the corresponding larvae of *H. bovis* boring into the skin of calves at Ballyhaise, Co. Cavan (*l.c.*, pp. 219-221).

NOVEMBER 11.—The Club met at Leinster House, the President in the Chair.

N. COLGAN exhibited a preparation showing the cerebral ganglia with the eyes and auditory capsules or otocysts of the nudibranch, *Eolis papillosa*. Many of the numerous calcareous otoliths, or ear-stones, included in the otocysts were seen to be ruptured by the pressure of the cover glass, so as to show their quadripartite structure.

In a second slide the remarkable stellate hairs of a Mediterranean Euphorbiaceous plant, *Crotophora tinctoria*, were shewn. In this species the dense clothing of stellate hairs is associated with stellate scales resembling those which form the grey felting on the under-side of the common Sea Buckthorn, *Hippophaë rhamnoides*.

W. F. GUNN showed a slide which was interesting as a relic of the last Franco-Prussian War. It was a portion of one of the despatch films sent into Paris by Carrier Pigeon post during the siege of 1871. These despatches were printed from type, photo-micographed on a thin film of gelatine, rolled up, and inserted into a quill, and attached to the wings of pigeons. On arrival at their destination they were re-photographed to their original size. By this means a very long despatch could be conveyed by a single bird.

BELFAST NATURALISTS' FIELD CLUB.

JULY 25.—WASHING BAY.—A long deferred visit was paid to Washing Bay by a party of twenty-four members, mainly from the botanical section of the Club. This inlet of Lough Neagh lies at the extreme south-western corner of the great lake, in County Tyrone, and is not easy of access. Leaving Belfast by motor at one o'clock, the little village of Maghery was reached. Here the vehicle was left and the party proceeded to the ferry and crossed the Blackwater, which at this spot divides the counties of Armagh and Tyrone. The sandy shores of the lake proved excellent collecting ground for the botanists, as well as the great stretch of bogland which lies to the south of the lake. Among the most interesting plants found on the lake shore was *Spiranthes romanoffiana*, an addition to the flora of Tyrone; also *Teesdalia nudicaulis*, *Cicuta virosa*, and *Anthemis Cotula*. The last-mentioned plant grew on a sandy bank of the lake shore near Doon Point in an apparently natural habitat. It is, however, not regarded as a native plant in the district. On the Armagh side of the river *Butomus umbellatus* was noted, with *Lysimachia Nummularia*. On the bog *Drosera anglica* and *Rhynchospora alba* were recorded also.

DUBLIN NATURALISTS' FIELD CLUB.

JULY 18.—EXCURSION TO LOUGH BRAY.—About twenty members and friends left Dublin at 10.45, and were met at Bray by their conductor, R. M. Barrington, with two brakes, the start for Lough Bray being made before 11.30. A halt was made near Glencree Reformatory for the purpose of inspecting a small patch of boggy ground, long known to local botanists as a favoured habitat of the Ivy-leaved Bell-flower. This pretty plant

was shown in full flower, and in the same bog the local *Carduus pratensis* was seen to be growing plentifully, and *Habenaria chloroleuca* was also found. Arriving at Lough Bray, the party walked (by special permission) along the north shore of the Lower Lake, and lunched under the trees fringing its western corner. A somewhat hurried dash was then made for the Upper Lake, where the effects of ice action were explained by J. de W. Hinch, and *Isoetes Morei* was recognised in abundance in the shape of drift. The return drive was made *via* Powerscourt Demesne. A halt was made at Fassaroe, where Mrs. Barrington entertained the party to tea, and a visit to the Museum, where so many of the rarest Irish birds are on view, was afterwards much appreciated.

CORK NATURALISTS' FIELD CLUB.

SEPTEMBER 19.—EXCURSION TO VERNONMOUNT.—Sixteen members and friends walked from Douglas to Vernonmount, by Inch Lane and Vernonmount Glen. John Griffin, who conducted, gave a "chat" on wayside plants, on the way. The grounds at Vernonmount were visited by permission of Mrs. Lane. An old but well-preserved Cedar of Lebanon was a conspicuous object. In the days of the old Royal Cork Institution, many species of plants, some of which are still represented there, were introduced into Vernonmount and Ballyphehane bogs, which are situated near what were then the Botanic Gardens. Owing to the inaccessibility of the bogs on the occasion of the visit, members were unable to investigate their flora. Vernonmount was the residence of Sir Henry Hayes, who was transported to Botany Bay in 1801. In "The Irish in Australia," by J. F. Hogan, the extraordinary statement is made concerning him that he banished snakes from his home near Sydney, by surrounding it by Irish earth, specially imported in barrels.

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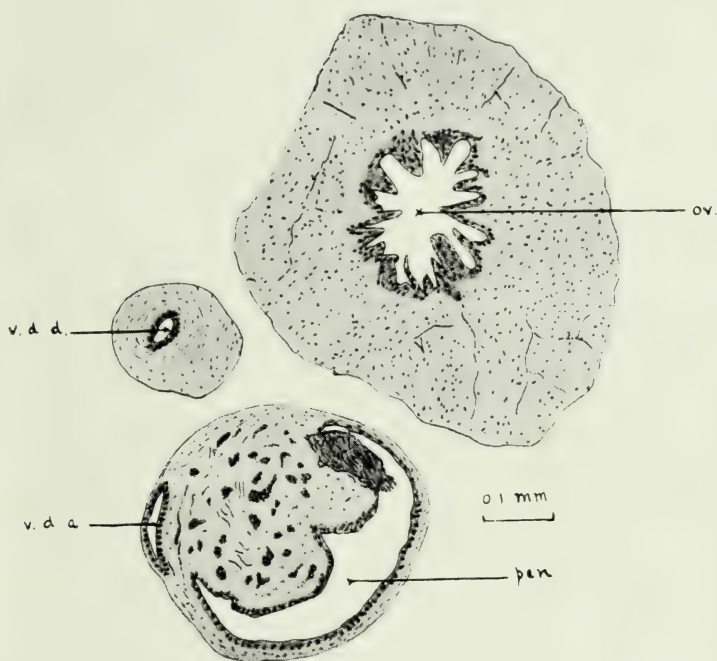
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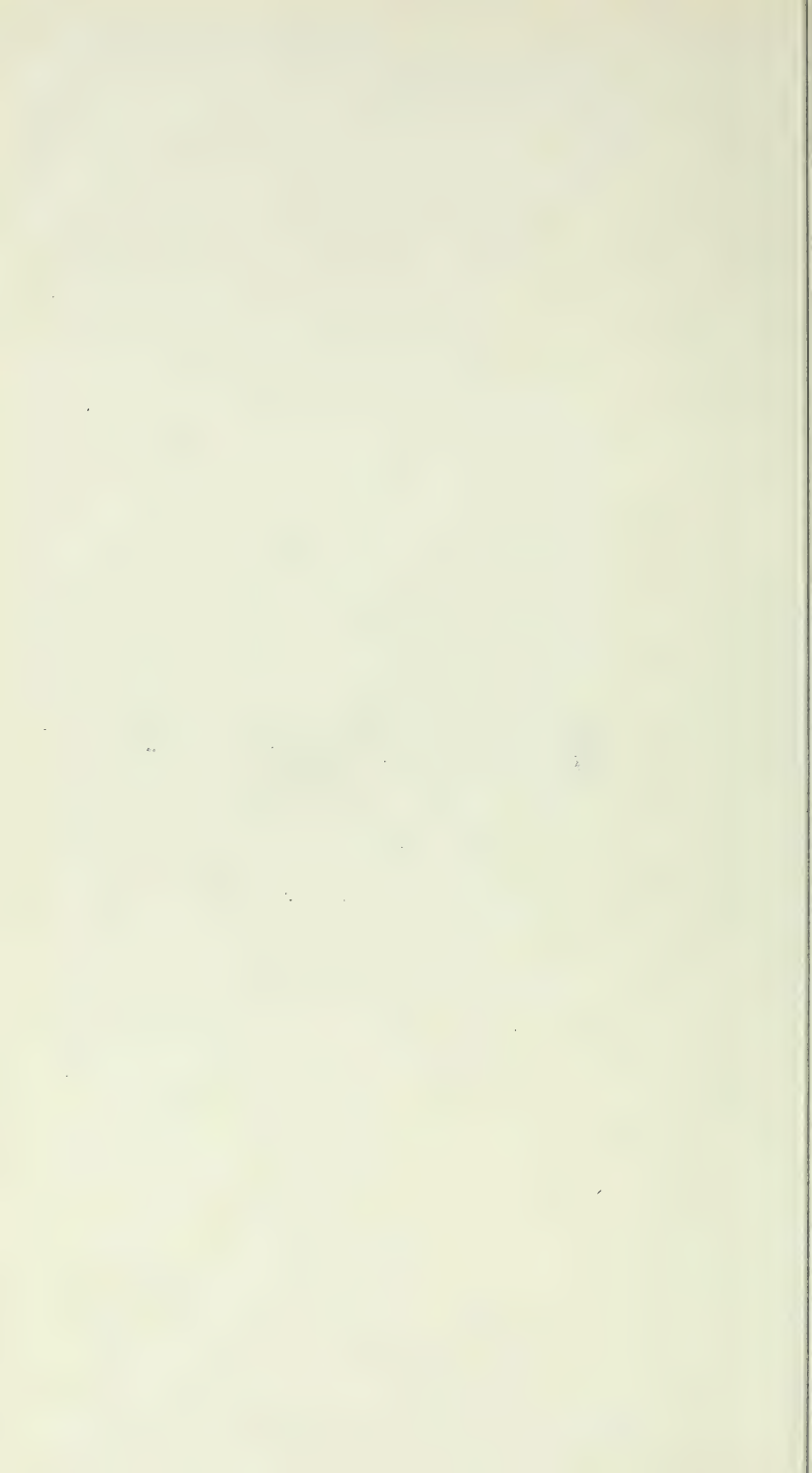
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